INDIAN MEDICINAL PLANTS

VOL. IV

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&
BASU

2ND EDITION

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INDIAN MEDICINAL PLANTS

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By

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Second Edition

IN FOUR VOLUMES

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LIST OF ILLUSTRATIONS

Plate No.	Species.	Page.
933	(Under Dendrobium Macræi Lindl.). Desmotrichum fimbriatum	2401
929	Eulophia campestris	2404
930	Eulophia nuda	2405
931	(Under V. Roxburghii). Vanda tessellata	2408
932	Saccolabium papillosum	2409
934A	Curcuma angustifolia	2418
935	Curcuma aromatica	2419
934B	Curcuma zedoaria	2420
936	Curcuma cæsia	2422
937A	Curcuma cæsia	2422
937A	Curcuma amada	2422
937B	Curcuma longa	2423
938	Kæmferia galanga	2426
939	Kæmferia angustifolia	2427
940	Kæmferia rotunda	2428
941A	Hedychium spicatum	2430
941B	Amomum xanthioides	2432
942	Amomum subulatum	2432
943	Amomum aromaticum	2434
944	Zingiber officinale	2435
945	Zingiber zerumbet	2438
946	Zingiber cassumunar	2439
947	Costus specious	2440
948	Elettaria cardamomum	2442
949	Alpinia galanga	2445
950	Alpinia allhugas	2447
951	Alpinia calcarata	2447
952A	Canna indica	2450
952B	Musa sapientum	2452
953	Sanseviera roxburghiana	2457
954A	Iris ensata	2460
955A	Iris nepalensis	2460
955B	Iris kumaonensis	2461
954B	Crocus sativus	2462
954C	Belamcanda chinensis	2464
956B	Agave americana	2466

Plate No.	Species.	Page.
956A	Curculigo orchioides	2469
957	Crinum asiaticum	2470
959	Crinum latifolium	2472
960	Dioscorea pentaphylla	2481
961	Dioscorea oppositifolia	2484
964	Smilax glabra	2495
965	Smilax lanceæfolia	2495
966	(Under S. macrophylla Roxb.). Smilax zeylanica	2496
967B	Asparagus filicinus	2498
968	Asparagus racemosus	2499
969	Asparagus adscendens	2501
967A	Asparagus gonoclados	2501
970B	Polygonatum multiflorum	2506
971	Asphodelus tenuifolius	2507
972	Allium ascalonicum	2510
970A	Allium cepa	2511
973	Allium sativum	2513
975	Scilla indica	2520
976	Lilium giganteum	2521
977	Lilium wallichum	2522
978A	Colchicum luteum	2524
978B	Glorisa superba	2525
979	Monochoria vaginalis	2529
980	Xyris indica	2534
981	Commelina obliqua	2534
982	Commelina suffruiticosa	2534
983	Aneilema scapiflorum	2538
984	Cyanotis tuberosa	2539
985	Cyanotis axillaris	2540
986	Areca catechu	2547
986A	Caryota urens	2557
987B	Phœnix dactylifera	2561
987A	Phœnix sylvestris	2563
988	Nannorhops ritchieana	2566
989	Borassus flabellifer	2571
990	Cocos nucifera	2581
992	Typha elephantiana	2595
993	Pistia stratiotes	2600
994	Arisæma speciosum	2603
995	Arisæma tortuosum	2604
996	Arisæma leschenaultii	2604

Plate No.	Species.	Page.
997	Sauromatum guttatum	2606
998	Typhonium trilobatum	2607
999	Amorphophallus campanulatus	2609
1000	Synantheris sylvatica	2611
1001	Plesmonium margaritiferum	2612
1002	(Under C. antiquorum Schott). Colocasia esculenta	2614
1003	Alocasia indica	2616
1004	Homalomena aromatica	2619
1005	Scindapsus officinalis	2621
1006	Rhaphidophora pertusa	2622
1007	Lasia heterophylla	2623
1008	Acorus calamus	2626
1009B	Kyllinga monocephala	2634
1009A	Juncellus inundatus	2636
1010	Cyperus scarious	2637
1011	Cyperus rotundus	2638
1012	Cyperus esculentus	2640
1013	Scirpus grossus	2644
1014B	Saccharum officinarum	2662
1014A	Saccharum arundinaceum	2665
1015B	(Under Andropogon Squarrosus). Vetiveria zizanoides	2671
1015A	(Under Andropogon schœnanthus). Cymbopogon schœnanthus	2677
1016	(Under A. langier)	
1017	(Under Andropogon nardus Linn.). Cymbopogon nardus	2680
1018	(Under Andropogon citratus DC). Cymbopogon citratus	2681
1019	Avena fatua	2686
1020	Cynodon dactylon	2689
1022	Dactyloctenium aegyptium	2697
1023	Hordeum vulgare	2702
1024	Bambusa arundinacea	2724
1025	Dendrocalamus strictus	2728
1031	Adiantum lunulatum	2735
1029	Adiantum caudatum	2736
1028	Adiantum capillus veneris	2737
1030	Adiantum flabellulatum	2740
1026	Cheilanthes tenuifolia	2741
1027	Actiniopteris dichotoma	2745
1032	Drynaria quercifolia	2747

CONTENTS

VOLUME IV

PHANEROGAMIA

CYCADACEAE

(Page 2395—2397)

	Page
Cycas	2395—2397
rumphii	2396
revoluta	2397

HYDROCHARITACEAE

(Page 2397—2398)

Vallisneria	2397—2398
spiralis	2398

ORCHIDACEAE

(Page 2399—2415)

Desmotrichum	2400—2402
fimbriatum	2401
Dendrobium	2402—2403
ovatum	2403
Eulophia	2403—2405
campestris	2404
nuda	2405
Cymbidium	2406
aloifolium	2406
Vanda	2406—2409
spathulata	2407
tessellata	2408
Saccolabium	2409—2410
papillosum	2409
Acampe	2410—2411
wightiana	2411
Zeuxine	2411—2412
strateumatica	2412

Page

Orchis . . . . 2412—2413
    latifolia 2413
Habenaria . . . . 2413—2415
    commelinifolia 2414

SCITAMINEAE [Zingiberaceae].

(Page 2415—2456)

Curcuma . . . . 2417—2426
    angustifolia 2418
    aromatica 2419
    zedoaria 2420
    cæsia 2422
    amada 2422
    longa 2423
✓ Kaempferia . . . . 2426—2428
    galanga . . . . 2426 ✓
    angustifolia 2427
    rotunda 2428
Gastrochilus . . . . 2428—2429
    pandurata 2429
✓ Hedychium . . . . 2429—2431
    spicatum 2430
Amomum . . . . 2431—2435
    xanthioides 2432
    subulatum 2432
    aromaticum 2434
    costatum 2434
✓ Zingiber . . . . 2435—2440
    officinale 2435
    zerumbet 2438
    cassumunar 2439
Costus . . . . 2440—2442
    speciosus 2440
Elettaria . . . . 2442—2444
    cardamomum 2442
✓ Alpinia . . . . 2444—2449
    galanga 2445
    allughas 2447
    calcarata 2447
    malaccensis 2448
    speciosa 2448

Page
Maranta 2449
  arundinacea 2449
Canna . . . . . 2450—2452
  indica 2450
Musa . . . . . 2452—2456
  sapientum 2452
  textilis 2456

HAEMODORACEAE
(Page 2456—2458)

Sansevieria . . . . . 2457—2458
  roxburghiana 2457

IRIDACEAE
(Page 2458—2464)

Iris . . . . . 2459—2462
  ensata 2460
  nepalensis 2460
  kumaoniensis 2461
  soongarica 2461
Crocus . . . . . 2462—2463
  sativus 2462
Belamcanda 2464
  chinensis 2464

AMARYLLIDACEAE
(Page 2465—2475)

Agave . . . . . 2465—2468
  americana 2466
  angustifolia 2468
  vera-cruz 2468
Curculigo . . . . . 2469—2470
  orchioides 2469
Crinum . . . . . 2470—2474
  asiaticum 2471
  latifolium 2472
  defixum 2473
Polianthes . . . . . 2474—2475
  tuberosa 2474

TACCACEAE

(Page 2475—2477)

Page

Tacca . . . . 2475—2477
    pinnatifida 2476
    aspera 2476

BROMELIACEAE

(Page 2477—2479)

Ananas . . . . 2477—2479
    sativus 2478

DIOSCOREACEAE

(Page 2479—2490)

Dioscorea . . . . 2480—2490
    pentaphylla 2481
    oppositifolia 2484
    bulbifera 2485
    triphylla 2489
    alata 2490
        „ *var* globosa 2490

LILIACEAE

(Page 2490—2528)

Smilax . . . . 2494—2498
    glabra 2495
    lanceæfolia 2495
    zeylanica 2496
    prolifera 2497
Asparagus . . . . 2498—2503
    filicinus 2498
    racemosus 2499
    adscendens 2501
    gonoclados 2501
    officinalis 2502
Yucca . . . . 2503—2504
    gloriosa 2503
    aloifolia 2503
Aloe . . . . 2504—2506
    vera 2504

Page

Polygonatum . . . . 2506—2507
  multiflorum 2506
Asphodelus . . . . 2507—2508
  tenuifolius 2507
Chlorophytum . . . . 2508—2509
  arundinaceum 2509
Allium . . . . 2509—2517
  ascalonicum 2510
  cepa 2511
  sativum 2513
  schænoprasum 2515
  tuberosum 2516
  ampeloprasum 2516
Urginea . . . . 2517—2519
  indica 2518
  coromandeliana 2519
Scilla . . . . 2519—2521
  indica 2520
Lilium . . . . 2521—2522
  giganteum 2521
  wallichianum 2522
Fritillaria . . . . 2522—2524
  imperialis 2522
  roylei 2523
  cirrhosa 2523
Colchicum . . . . 2524—2525
  luteum 2524
Gloriosa . . . . 2525—2528
  superba 2525

PONTEDERIACEAE

(Page 2528—2530)

Monochoria . . . . 2529—2530
  vaginalis 2529

XYRIDACEAE

(Page 2530—2532)

Xyris . . . . 2531—2532
  indica 2531
  anceps 2532

COMMELINACEAE

(Page 2532—2541)

	Page
Commelina	2533—2537
obliqua	2534
suffruticosa	2534
nudiflora	2535
benghalensis	2536
salicifolia	2536
Aneilema	2537—2538
scapiflorum	2538
Cyanotis	2538—2540
tuberosa	2539
axillaris	2540
Floscopa	2540—2541
scandens	2541

FLAGELLARIACEAE

(Page 2541—2543)

Flagellaria	2542—2543
indica	2542

JUNCACEAE

(Page 2543—2544)

Luzula	2543—2544
campestris	2543

PALMAE

(Page 2544—2591)

Areca	2546—2550
catechu	2547
nagensis	2549
Loxococcus	2550—2551
rupicola	2551
Pinanga	2551—2552
dicksonii	2552
Arenga	2552—2555
saccharifera	2553
obtusifolia	2554

Page
Wallichia . . . . . 2555—2556
    disticha 2556
Caryota . . . . . 2556—2560
    urens 2557
    mitis 2559
Phœnix . . . . . 2560—2566
    dactylifera 2561
    sylvestris 2563
    pusilla 2565
Nannorhops . . . . . 2566—2567
    ritchieana 2566
Copernicia . . . . . 2567—2570
    cerifera 2568
Corypha . . . . . 2570—2571
    umbraculifera 2570
Borassus . . . . . 2571—2575
    flabellifer 2571
✓Lodoicea . . . . . 2575—2577
    seychellarum 2575
Elaeis 2577
    guineensis 2578
Cocos . . . . . 2580—2586
    nucifera 2581
    schizophylla 2585
    yatai 2586
Calamus . . . . . 2586—2589
    rotang 2587
    travancoricus 2588
    rheedii 2589
Nipa . . . . . 2590—2591
    fruticans 2590

PANDANACEAE

(Page 2591—2593)

Pandanus . . . . . 2591—2593
    tectorius 2592

TYPHACEAE

(Page 2594—2597)

Typha . . . . . 2594—2597
    angustata 2595

Page
elephantina 2595
laxmanni 2596

ARACEAE

(Page 2597—2630)

Cryptocoryne . . . . 2598—2600
spiralis 2599
Pistia . . . . 2600—2602
stratiotes 2600
Lagenandra 2602
ovata 2602
Arisæma . . . . 2602—2605
speciosum 2603
tortuosum 2604
leschenaultii 2604
Sauromatum . . . . 2605—2607
guttatum 2606
Typhonium . . . . 2607—2608
trilobatum 2607
Amorphophallus . . . . 2608—2610
campanulatus 2609
prainii 2610
Synantherias 2611
sylvatica 2611
Plesmonium 2612
margaritiferum 2612
Remusatia . . . . 2612—2613
vivipara 2613
Colocasia . . . . 2613—2616
esculenta 2614
Alocasia . . . . 2616—2619
indica 2616
macrorrhiza 2617
montana 2618
denudata 2618
Homalomena . . . . 2619—2620
aromatica 2619
rubescens 2620
Scindapsus . . . . 2620—2622
officinalis 2621

Page
Rhaphidophora . . . . 2622—2623
pertusa 2622
Lasia . . . . 2623—2624
heterophylla 2623
Pothos . . . . 2624—2626
scandens 2625
cathcarti 2625
Acorus . . . . 2626—2630
calamus 2626
gramineus 2629

ALISMACEAE

(Page 2630—2631)

Sagittaria . . . . 2630—2631
sagittifolia 2631

CYPERACEAE

(Page 2632—2647)

Kyllinga . . . . 2632—2635
triceps 2633
monocephala 2634
Fimbristylis . . . . 2635—2636
junciformis 2635
Juncellus 2636
inundatus 2636
Cyperus . . . . 2636—2644
scariosus 2637
rotundus 2638
esculentus 2640
longus 2642
articulatus 2642
iria 2643
Scirpus . . . . 2644—2647
grossus 2644
articulatus 2645
kysoor 2646
maritimus 2646

GRAMINEAE

(Page 2647—2729)

Page

Oryza . . . . 2651—2653
  sativa 2651
Hygroryza . . . . 2653—2654
  aristata 2653
Coix . . . . 2654—2656
  lachryma-jobi 2655
Polytoca . . . . 2656—2658
  barbata 2657
Zea . . . . 2658—2661
  mays 2659
Saccharum . . . . 2661—2669
  ✓ officinarum 2662
  arundinaceum 2665
  munja 2666
  spontaneum 2668
Manisuris . . . . 2669—2670
  granularis 2669
Vetiveria . . . . 2670—2673
  zizanioides 2671
Amphilophis . . . . 2673—2674
  odorata 2674
Cymbopogon . . . . 2675—2683
  jwarancusa 2676
  schoenanthus 2677
  nardus 2680
  citratus 2681
Heteropogon . . . . 2683—2685
  contortus 2684
Avena . . . . 2685—2687
  fatua 2686
  sativa 2687
  sativa *var.* orientalis 2687
Desmostachya . . . . 2687—2689
  bipinnata 2688
Cynodon . . . . 2689—2692
  dactylon 2689
Eleusine . . . . 2692—2694
  coracana 2692
  indica 2693

Page

- Phragmites . . . 2695—2696
  - maxima . . . 2695
- Dactyloctenium . . . 2696—2698
  - aegyptiacum . . . 2697
- Agropyron . . . 2698—2699
  - repens . . . 2698
- Triticum . . . 2699—2702
  - aestivum . . . 2700
  - durum . . . 2702
  - spelta . . . 2702
  - amyleum . . . 2702
- Hordeum . . . 2702—2704
  - vulgare . . . 2702
- Paspalum . . . 2704—2706
  - scrobiculatum . . . 2705
- Pennisetum . . . 2706—2708
  - spicatum . . . 2706
  - compressum . . . 2708
- Thysanolaena . . . 2708—2709
  - procera . . . 2708
- Panicum . . . 2709—2714
  - miliaceum . . . 2710
  - miliare . . . 2712
  - antidotale . . . 2713
- Echinochloa . . . 2714—2717
  - colona . . . 2715
  - colona *var* frumentacea . . . 2715
  - crus-galli . . . 2716
- Setaria . . . 2717—2720
  - italica . . . 2718
  - plicata . . . 2719
  - viridis . . . 2720
- Sorghum . . . 2720—2724
  - halepense . . . 2721
  - vulgare . . . 2723
- Bambusa . . . 2724—2727
  - arundinacea . . . 2724
- Dendrocalamus . . . 2727—2729
  - strictus . . . 2728

CONTENTS

VOLUME IV

CRYPTOGAMIA

FILICIS

POLYPODIACEAE

(Page 2733—2749)

Page

Cibotium . . . . 2733—2734
    barometz 2733
Stenoloma 2734
    chinensis 2734
Adiantum . . . . 2735—2740
    lunulatum 2735
    caudatum 2736
    capillus-veneris 2737
    aethiopicum 2738
    venustum 2738
    pedatum 2739
    flabellulatum 2740
Cheilanthes . . . . 2740—2741
    tenuifolia 2741
Pteris . . . . 2741—2742
    aquilina 2741
Asplenium . . . . 2742—2744
    adiantum-nigrum 2743
    ruta-muraria 2743
    trichomanes 2744
    falcatum 2744
Athyrium 2745
    filix-foemina 2745
Actiniopteris 2745
    dichotoma 2745
Aspidium 2746
    polymorphum 2746
Drynaria 2747
    quercifolia 2747

Page

Pleopeltis 2748
lanceolata 2748
Lygodium , ... 2748—2749
flexuosum 2748
japonicum 2749

OSMUNDACEAE
(Page 2749—2750)

Osmunda 2749
regalis 2750

OPHIOGLOSSACEAE
(Page 2750—2753)

Ophioglossum . . . . 2750—2751
vulgatum 2751
Helminthostachys . . . . 2751—2752
zeylanica 2752
Botrychium . . . . 2752—2753
lunaria 2752
ternatum 2753

EQUISETACEAE
(Page 2753—2754)

Equisetum 2754
debile 2754

FUNGI
(Page 2755—2758)

Agaricus . . . . 2755—2756
campestris 2755
ostreatus 2756
igniarius 2756
Polyporus 2757
anthelminticus 2757
officinalis 2757
Boletus 2758
crocatus 2758
Mylitta 2758
lapidescens 2758

z.

Page

Auricularia 2758
  sambucina 2758

ALGAE
(Page 2759)

LICHENES
(Page 2760—2761)

Parmelia 2760
  kamstchadalis 2760
  perlata 2760
  perforata 2760

पुस्तकालय
गुरुकुल कांगड़ी विश्वविद्यालय
हरिद्वार

INDIAN MEDICINAL PLANTS

PHANEROGAMIA

CYCADACEAE.

Shrubs or small trees, with a thick simple (rarely forking) stem and terminal crown of leaves, or stemless with leaves arising from a tuberous simple or branched rootstock. Leaves in alternate series of short coriaceous scales and of palm-like pinnate (rarely 2-3-pinnate) leaves with membranous or coriaceous leaflets. Flowers dioecious; males in one or more terminal cones formed of numerous fleshy flat or variously peltate scales hearing on their underside crowded 1-celled anthers; females of flat carpellary leaves (carpophylls) crowded round the apex of the stem (in Cycas) or of flat or thickened variously peltate scales arranged in cones. Ovules large, sessile, orthotropous, either numerous and erect in notches on either margin of the carpophyll or solitary and inverted on either side of the peltate scales. Seeds large, drupaceous, with more or less fleshy external and crustaceous or bony internal coat. Albumen copious with one or more embryo scars. Embryo usually one by abortion, slender, radicle superior attached to the crumpled suspensory cord. Cotyledons 2.—Genera 9. Species about 75.—Tropical and subtropical.

The Order is not therapeutically defined.

Cycas Linn.

Shrubs or trees with a simple or rarely branched cylindric trunk clothed with the woody bases of the petioles. Leaves in terminal crowns linear-oblong, pinnate, leaflets linear entire, 1-nerved, involute in vernation, lower often reduced to spines. Male cones apparently terminal (finally thrust aside by growth of stems), peduncled; scales cuneate, closely imbricate, apex often long-acuminate upcurved, anthers in groups of 3-5. Carpophylls numerous, crowded round the apex of the stem, densely woolly, appressed at first into an apparently terminal cone, then spreading (and stem continuing its growth through them), elongate, flattened, dilated above into an entire, crenate or pectinate blade. Ovules 2-10, in notches on the margins of the lower part of the carpophyll, distant, alternate or opposite, nearly erect. Seeds ellipsoid- or globose.—Species 16.—E. India, Australia, Polynesia.

1. Leaves 0.6-1.2 m. long .... 1. *C. rumphii.*
2. Leaves 0.6-1.8 m. long .... 2. *C. revoluta.*

The genus is therapeutically inert.

C. rumphii Miq. is used medicinally in Cambodia.

1. **Cycas rumphii** Miq. in Bull. Sc. Phys. Nat. Néerl. (1839) 45.—*C. circinalis* Roxb. Fl. Ind. III (1832) 744.

An evergreen palm-like tree, with a thick cylindrical scared trunk either simple or when old branched, all parts glabrous. Leaves crowded at the top of the trunk, 0.6-1.2 m. long, glabrous, pinnate, and towards the summit pinnatisect, the segments elongate-linear, 15-25 cm. long, acuminate, 1-nerved, without visible veins, the lower pinules reduced to reflexed, short, straight spines along the obscurely 3-gonous petiole. Male flower-cones about 45 cm. long, erect, on a short, thick, linearly-scaled peduncle, the flower-scales about 3.8 cm. long, obovate-cuneate, with the lateral angles sharply prominent and forming a triangular thickened apex and produced in a long, thick, more or less reflexed or recurved rusty-tomentose acumen, glabrous above, beneath covered with stellately connected pollen-cells; the female carpellary leaves very long-stalked, densely tawny-villous, those of the outer rows up to 30 cm. long or somewhat longer, becoming shorter towards the centre, the blade from ovate to ovate-lanceolate, very little toothed or lobed along the margin and terminating in a very long entire acumen. Ovules immersed in the prominent cymbiform and shortly acuminate receptacles, about 3-5 on each side of the broad upper part of the petiole (or more correctly the fertile lower part of the blade). Fruits glabrous, ovoid-oblong, the size of a hen's egg, orange-yellow.

Distribution: Burma, Malay Peninsula, Andamans and Nicobars, often cultivated in Indian gardens.—Moluccas, New Guinea, N. Australia.

The resin is applied to malignant ulcers, and it excites suppuration in an incredibly short time (Kurz).

In Cambodia, the leafless bulb is brayed in water, rice water, or water holding fine particles of clay in suspension, and applied to ulcerated wounds, swollen glands, and boils.

Burma: Mondaing—; *Cambodia:* Prang—; *Canarese:* Godduyichalu—; *English:* Malayan Fern Palm—; *Malayalam:* Toddamaram, Tutappana—; *Sinhalese:* Mahamadu—; *Tamil:* Kama, Payindu—; *Telugu:* Ranaguvva, Waragudu—; *Uriya:* Oruguno, Rosaimaro—.

2. **Cycas revoluta** Thunb. Fl. Japon. (1784) 229; J. E. Smith in Trans. Linn. Soc. VI (1802) 312, t. 29, 30.

Trunk 1.8 m., densely clothed with the old leaf-bases. Leaves 0.6-1.8 m. long; petiole thick, quadrangular; leaflets narrow, margin revolute. Carpophylls 10-23 cm. long, blade ovate, laciniate nearly to the midrib, stalk longer than blade with 4-6 ovules. Immature seed densely tomentose.

Distribution: China, S. Japan, Formosa, Tonkin.—Cultivated in Indian gardens.

The plant is considered expectorant and tonic.

English: China Fern Palm, China Sago Palm, Japan Fern Palm, Japan Sago Palm—; *Tamil:* Madanagamesuvari—.

HYDROCHARITACEAE.

Aquatic usually submerged herbs. Leaves undivided. Flowers regular, monoecious or dioecious (rarely 2-sexual), enclosed in an entire or 2-leaved spathe; females solitary; perianth superior. Sepals 3, green or petaloid. Petals membranous or 0. Male flowers: Stamens 3-12 in 1-4 series; anthers 2-celled. Female flowers: Ovary inferior, 1-celled; placentas 3-6, parietal or intruded, sometimes almost meeting at the axis; ovules numerous on each placenta, anatropous or orthotropous; styles or style-arms 3-12. Fruit globose or ovoid, dry or pulpy (rarely dehiscent). Seeds few or many;

albumen 0; embryo smooth or lineate.—Genera 13, Species 80.—Tropics and temperate regions.

The Order does not exhibit any therapeutic property.

VALLISNERIA Linn.

A submerged tufted stemless stoloniferous herb. Leaves very long, linear. Flowers dioecious, the males many, minute, in an ovoid 3-lobed, shortly pedunculate spathe, the females solitary in a tubular 3-toothed spathe terminal on a very long filiform spiral scape. Sepals 3. Petals 0. Male flowers: Stamens 1-3; filaments rather thick; anthers didymous. Pistillode 0. Female flowers: Staminodes 3, each 2-fid. Ovary narrow, not produced upwards; ovules numerous; stigmas 3, broad, notched. Fruit linear, included in the spathe. Seeds numerous, oblong; testa membranous.—Species 3.—Tropics and subtropics.

The genus is therapeutically inert.

1. **Vallisneria spiralis** Linn. Sp. Pl. (1753) 1015; Wight Ill. tt. 23, 24.

Leaves radical, narrow, linear, varying in length with the depth of the water, reaching sometimes 37.5 by 1.3 cm., green, translucent, entire or the tips serrulate. Male flowers numerous, minute. Spathe shortly pedunculate, 6 mm. long, breaking off at the base when the flowers emerge and float on the surface of the water. Pedicels long, slender. Stamens 1-3. Female flowers solitary. Spathe 3-toothed, carried to the surface of the water in flower by the uncoiling of the long filiform spiral scape, which, after fertilization, again coils close and brings the ovary down to ripen under water. Fruit linear, included in the spathe, many-seeded.

Distribution: Throughout India, Westwards to Spain, and in warm regions of the Old and New Worlds.

The plant is stomachic. It is used in leucorrhœa.

Chinese: K'u, Ts'ao—; *English:* Eel Grass—; *Gujarat:* Jalasarpolian—; *Hindi:* Jallil, Sawal, Sawala, Siyal, Syala—; *Tagalog:* Cintascintasan—; *Telugu:* Panchadub, Punatsu—.

ORCHIDACEAE.

Herbs (rarely shrubby), usually either (1) terrestrial often tuberous-rooted with annual herbaceous leafy or leafless simple stems and with solitary or spicate or racemose flowers, or (2) epiphytes with perennial stems or branches usually leafy, variously thickened and often forming a pseudobulb, flowering from the top, sides, or base of the pseudobulb; bracts usually present. Flowers hermaphrodite, irregular, often showy. Perianth superior, of 6 free or variously connate segments, 2-seriate; 3 outer segments (sepals more or less similar, the 2 lateral sometimes connate in a short or long sac or spur-like base (mentum) 3 inner segments dissimilar, the 2 lateral alike and often resembling the sepals, the remaining petal (lip) usually very differently shaped. Stamens and style united in a column opposite the lip; anther usually 1 (sometimes 2) on the front, top, or back of the column and free or adnate to it, 2-celled or, by subdivision, 4-celled; top of the column sometimes produced towards the lip into a beak (rostellum); pollen-grains usually coherent in each cell into 1, 2, or 4 pairs of oblong or globose or pyriform waxy or powdery masses (pollinia), which are free or adnate by pairs or fours immediately or by a stalk (caudicle) to a gland. Ovary inferior, 1-celled, usually linear or twisted; ovules many, minute; stigma one or two viscid spots on the top or concave face of the column, opposite the lip and below the anther. Fruit a capsule, usually opening by 3 or 6 longitudinal fissures (rarely fleshy and subindehiscent). Seeds very many, minute, with a lax hyaline testa enclosing a homogeneous nucleus.—Genera 610. Species about 8,000—Cosmopolitan, abundant in tropical, rare in arctic regions.

A. Anther 1, opercular. Pollinia waxy, 1-4 in each cell.
  Lip adnate to the produced foot of the column, contracted at the base of clawed
    a. Flowers fascicled .... DESMOTRICHUM
    b. Flowers solitary or in fascicles or racemes .... DENDROBIUM.
B. Anther 1, posticous. Pollinia waxy, usually 2 or 4
  I. Scape usually leafless. Petals like the dorsal sepal; lip gibbous or saccate, rarely spurred .... EULOPHIA.
  II. Sepals and petals subequal, spreading; lobes of the lip embracing the unwinged column. Leafy stems short, pseudobulbous .... CYMBIDIUM.

III. Sepals and petals fleshy, widely spreading from a narrow base. Flowers large, in simple racemes .... VANDA.

IV. Sepals and petals widely spreading. Column without appendages. Flowers small, in simple or branched racemes SACCOLABIUM.

V. Sepals and petals thick, concave. Flowers small, crowded in a short rigid, simple or branched peduncle .... ACAMPE.

C. Stem not bulbous. Anther 1, posticous, opercular or erect and persistent. Pollen granular, powdery or in small masses

Sepals free, dorsal with the petals cohering in a hood. Column without appendages .... ZEUXINE.

D. Anther 1, posticous, erect, inclined or reflexed. Pollinia 1 rarely 2 in each cell, granular, produced into short caudicles. Terrestrial herbs

I. Lip spurred. Glands of the pollinia both in one pouch .... ORCHIS.

II. Lip spurred, sepals equalling or exceeding the petals. Flowers spicate or racemose; rostellum not elongate ...... HABENARIA.

Emollient and bechic; stimulant and tonic, sudorific and diuretic, antiperiodic and antiscorbutic.

The occurrence of a glucoside, loroglossin, has been recorded.

OFFICIAL :—Vanillin in Belgium, France, Germany, Spain, Sweden, United States.

Anacamptis spp. in Japan.

Cremastra spp. in Japan.

Epidendrum Vanilla Linn. (*Vanilla aromatica* Swartz) in Portugal.

Gymnadenia spp. in Austria.

Ophrys spp. in Austria, Germany, Norway, Portugal Switzerland.

Orchis spp. in Austria, Japan, Norway, Portugal; *O. mascula* Linn. (Russia); *O. militaris* Linn. (Holland, Russia); *O. Morio* Linn. (Belgium, Russia).

Platanthera spp. in Austria, Norway; *P. bifolia* Rich., *P. chlorantha* Cust. in Russia.

Vanilla planifolia Aldr. (Belgium),—Andr. (Austria, France, Japan, Switzerland, Turkey)=*Myrobroma fragrans* Salisbury (Portugal).

DESMOTRICHUM Bl

Epiphytic herbs. Stems long-pendulous, clothed with imbricating cataphylls, radical, branching. Branches often thickened into fusiform or subcylindrical bulbs which bear usually 1 leaf rarely 2. Flowers fascicled, arising from the axil of the leaf, fugaceous. Bracts scarious, always much shorter than the thin pedicels, forming a capitulum. Dorsal sepal and smaller petals attached to the back and sides of the column; lateral sepals adnate to the foot of the column and forming with it a small mentum (spur) which is more or less closed in front. Basal part of lip always narrow, rather elongate, prolonged in front into small lateral lobes; midlobe flabellate or dilate, with the margin or less pinnatifid or sinuate, always undulate or fimbriate or pilose, the 2 lines near the margin of the disk more or less undulate. Column as in DENDROBIUM.—Species about 30.—Indo-Malaya.

The genus is therapeutically inert.

1. **Desmotrichum fimbriatum** Bl. Bijdr. (1825) 329.—*Dendrobium Macraei* Lindl. Gen. et Sp. Orchid. 76.—PLATE 933 (under *Dendrobium Macraei* Lindl.).

Rhizome creeping, annulate, giving off pendulous smooth polished stems 60-90 cm. long, bearing at irregular intervals narrowly fusiform somewhat compressed shining pseudobulbs 5-6.3 cm. long; internodes long, terete. Leaf terminal from the top of the pseudobulb, solitary. 10-20 by 2-2.5 cm., linear-oblong, obtuse, with numerous parallel slender veins. Flowers remaining open for a few hours only, 1-3 from near the base of a leaf, 2-2.5 cm. across, white, the lip and mentum yellow (in the Sikkim specimen figured in the Annals of the Royal Botanic Garden, Calcutta (l.c.), the side-lobes of the lip are shown pale pink speckled with red, the middle greenish yellow); bracts beneath the flower small, ovate, acute, sheathing. Sepals oblong-lanceolate, subacute, spreading. Mentum (spur) short, broad, conical. Petals narrower than the sepals, linear-oblong, obtuse. Lip oblong-obovate in general outline, decurved about the middle, concave; side-lobes oblong, obtuse, the disk between them with 2 fleshy crests; midlobe contracted and coarsely erose-crisped at its base, the terminal part expanded and the edges much plicate. Column short with a short foot; pollinia narrowly oblong.

Distribution: W. Ghats of Bombay and Madras Presidencies, Ceylon, Sikkim, Khasia Hills, Burma, Malay Peninsula.—Malay Archipelago to the Philippines.

The plant is sweet with a flavour; cooling, alterative, astringent to the bowels, tonic, aphrodisiac, expectorant; useful in asthma, bronchitis, "tridosha," throat troubles, consumption, fevers, burning sensations, biliousness, diseases of the eye and the blood.—The fruit is sweet; aphrodisiac (Ayurveda).

The plant is stimulant and tonic.

It is prescribed by Sushruta in combination with other drugs for the treatment of snake-bite and scorpin-sting; but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Bengal: Jibai, Jibanti—; *Gujerati:* Jivanti, Radarudi, Wajhanti—; *Hindi:* Jiban, Joivanti, Sag—; *Marathi:* Jivanti—; *Sanskrit:* Bhadra, Jiva, Jivabhadra, Jivada, Jivani, Jivaniya, Jivanti, Jivapatri, Jivapushpi, Jivavardhini, Jivavrisha, Jivdatri, Jivya, Kanjika, Kshudrajiva, Madhushvasa, Madhusrava, Mangalya, Mrigaratika, Payaswini, Pranada, Putrabhadra, Raktangi, Shakashreshtha, Shashashimbika, Shringati, Srava, Sukhankari, Supringala, Yashaskari, Yashasya—; *Sinhalese:* Jatamakuta—.

DENDROBIUM Swartz.

Epiphytic herbs; pseudobulbs short and fleshy or elongated and stem-like, usually tufted. Leaves sessile, never plicate, bases sheathing. Flowers solitary or in fascicles or racemes, often large and showy. Sepals subequal, the ~~latter~~ obliquely adnate to the foot of the column and forming with it a sac or mentum (spur). Petals usually like the sepals. Lip sessile or clawed at the base, adnate to and incumbent on the foot of the column; side-lobes embracing the column or spreading or 0; terminal lobe broad or narrow, flat, convex, concave or saccate, its disk sometimes lamellate. Column short, its foot long or short with usually a nectar-secreting depression or cavity at its extremity, the apex angled or 2-toothed; anther 2-celled; pollina 4, equal in length, sometimes in free pairs but usually all slightly coherent, the 4 never all quite free, ovoid or oblong, slightly compressed, waxy.—Species about 750.—Tropical Asia, Japan, Australia, Polynesia.

The stem has tonic, stomachic, pectoral, and antiphlogistic properties.

D. moniliforme Sw. is used medicinally in China; *D. reptans* Franch. and Sav. in Japan; *D. nobile* Lindl. in Malaya.

1. **Dendrobium ovatum** (Willd.) Kränzl. in Engl. Pflanzenr. IV, 50, II. B21 (1910) 71.—*D. chlorops* Lindl. in Bot. Reg. (1844) Misc. 44.

Stems tufted, 30-45 cm. long, usually slender. Leaves on first year's shoots 5-10 cm. by 6-13 mm., lanceolate, acute, the second year's shoots leafless and flower-bearing. Flowers 2 cm. diam., with a primrose-like scent when first expanded, in lateral and terminal racemes 7.5-15 cm. long; pedicels and ovary together reaching 13 mm. long in flower, slender; bracts below the pedicels 3 mm. long, ovate-lanceolate, acute. Sepals cream-coloured; lateral sepals 8 mm. long by 3 mm. broad at the base, oblong-lanceolate, subacute; dorsal sepal 8 mm. long, less than 3 mm. broad, oblanceolate, obtuse. Mentum (spur) conical, 5 mm. long. Petals 10 by 5 mm., cream-coloured, obovate. Lip flat, rather more than 10 mm. long; side-lobes small, rounded, greenish; midlobe large, subquadrate, cream-coloured; disk pubescent with a channelled ridge. Column greenish; anther white. Fruit not seen.

Distribution: W. Ghats and the W. coast of the Madras Presidency.

The entire plant, recently gathered, chiefly its juice, when given internally, cures all kinds of stomachache, excites bile and acts as a laxative to the intestines (Rheede).

Malabar: Maravar—.

EULOPHIA R. Br.

Terrestrial glabrous herbs with fleshy tubers or rhizomes (rarely pseudobulbous). Leaves appearing with or after the flowers, long, narrow, usually plicate. Flowers racemose, rarely paniculate, on a tall erect sheathed usually lateral scape. Sepals free, spreading, subequal. Petals subsimilar. Lip adnate to the base of the column or to its foot, base saccate or with a short spur; side-lobes erect and embracing the column (rarely 0); midlobe spreading or recurved; disk usually ridged or crested. Column with or without a foot, its apex entire and often oblique, the margins sometimes winged or lobed; anther terminal, sometimes with 2 apical processes, 2-celled; pollinia 2, globose, attached by a caudicle to the flat gland of the rostellum.—Species 200.—Warm countries of the Old World.

1. Column not produced into a foot. Flowers appearing long before the leaves .... 1. *E. campestris.*
2. Column produced into a foot: Lateral sepals inserted on the spur of the lip .... 2. *E. nuda.*

E. arenaria Bohn., *E. flaccida* Schltr., *E. hians* Spreng., *E. robusta* Rolfe. are used medicinally in South Africa.

E. campestris Wall., *E. nuda* Lindl., and *E. virens* Spreng. furnish the Lahore Salep of the bazaars.

1. **Eulophia campestris** Wall. Cat. 7617.—PLATE 929.

Tubers irregularly oblong, often lobed. Leaves 2, rising from the apex of a slender sheathing pseudostem, developing long after the plant has flowered, 25-40 cm. long, linear; acuminate, plicate. Scape 15-30 cm. long, sheathed at intervals by loose membranous bracts; raceme laxly many-flowered. Flowers drooping, subsecund, yellowish or green with pink or purple markings, about 2.5 cm. across; floral bracts, membranous, linear or lanceolate, acuminate, usually longer than the slenderly stalked ovary. Sepals slightly attached to the base of the lip, linear-lanceolate, acute or acuminate, 5-7-nerved. Petals spreading, narrower than the sepals, oblanceolate. 3-5-nerved. Lip as long as the sepals, cuneate-obovate or oblong; side-lobes short, rounded or subacute, incurved round the column; midlobe orbicular, quadrate or oblong, crenulate, usually purple: basal portion of disk with three median lamellae ending in a fimbriate or tubercled patch on the terminal lobe. Spur short, conical subclavate or subacute. Column as long as the lip, slender, without a foot. Pollinia broad; caudicle stout; gland elongate. Capsule 2 cm. long, ellipsoid.

Distribution: Sub-Himalayan tracts of Rohilkhand and N. Oudh, Nepal, Sikkim, Chittagong, Bengal, Upper -Burma, Baluchistan.—Afghanistan.

The tuber is an appetiser; stomachic, tonic, aphrodisiac, alterative; purifies the blood in heart troubles (Ayurveda).

The tuber is aphrodisiac, astringent, tonic; useful in stomatitis, purulent cough, paralytic infection (Yunani).

The plant furnishes a salep which is esteemed as a tonic and aphrodisiac.

Arabic: Khusyu-uth-thalab—; *Bengal:* Salibmisri, Sungmisrie—; *Gujerati:* Salum—; *Hindi:* Salibmisri—; *Marathi:* Salamishri—; *Nepal:* Hattipaila—; *Persian:* Sungmisri—; *Punjab:* Salibmisri—; *Sanskrit:* Amrita, Amritodbhava, Jiva, Jivani, Pranabhrita, Pranada, Sudhamuli, Virakanda—; *Santal:* Bongataini—; *Urdu:* Salabmisri—.

2. **Eulophia nuda** Lindl. in Wall. Cat. (1828) 7371.—PLATE 930.

Root tuberous, like a small potato, spherical, smooth. Leaves from the sides of the tuber (forming by their sheaths a short pseudostem), 25-35 cm. long, variable in breadth, elliptic-lanceolate, acute, plicate, narrowed into the long tubular sheath. Flowers 9-20, in lax racemes from the base of the pseudostem; scape 45-60 cm. long, erect, stiff, with a few wide sheaths at the base and some scattered upwards; bracts beneath the flowers 6-20 mm. long, lanceolate, acute; pedicels with ovary 2-3.2 cm. long. Sepals greenish purple, linear-oblong, acute, 7-nerved; lateral sepals 22 by 5 mm., inserted on the spur of the lip, slightly falcate; dorsal sepal 22 by 4 mm. Mentum (spur) very short, conical, obtuse, purplish green. Petals white 16 by 8 mm., oblong, obtuse, many-nerved. Lip 2.2 cm. long by 1.6 cm. broad across the side-lobes, white or yellow flushed with pink or purple; side-lobes short, rounded midlobe 13 mm. long, obovate-oblong, obtuse, crimped; disk with about 9 strong nerves. Column short with a long foot. Capsules 3.8 cm. long, fusiform, conspicuously ribbed; pedicels of capsules very short.

Distribution: Tropical Himalaya from Nepal eastwards to Sikkim, Chota Nagpur, Assam, Khasia Hills, Manipur, Burma, W. Peninsula, Ceylon.

The tuber is an appetiser; hot; useful for tuberculous glands in the neck, tumours, "vata," bronchitis.

It furnishes salep.

Bengal: Budbar—; *Hindi:* Ambarkand, Gourma—; *Marathi:* Ambarakand, Bhuikakali, Manakanda—; *Sanskrit:* Balakanda, Granthidala, Kandalata, Malakanda, Panktikanda, Trishikhadala—

CYMBIDIUM Swartz.

Epiphytes with a short stout pseudostem (rarely terrestrial or with an elongated leafy stem). Leaves coriaceous, very long and narrow (rarely elliptic). Flowers in many- or few- flowered erect or drooping racemes from the side of the pseudostem; peduncle with numerous sheaths; floral bracts various. Sepals and petals subequal, free, erect or spreading. Lip adnate to the base of the column and embracing it more or less by its convolute side-lobes; midlobe decurved, often with undulate edges; disk usually with 2 ridges. Column long, without a foot; anther 1-celled or imperfectly 2-celled; pollinia 2, ovoid, pyriform, cuneiform or globular, more or less partite, sessile on a small or large often strap-shaped gland.—Species 30.—Africa to Australia and Japan.

The genus is therapeutically inert.

1. **Cymbidium aloifolium** Swartz in Nov. Act. Upsal. VI (1799) 73.

Pseudostem short. Leaves 30-45 by 2-2.8 cm., linear-oblong, curved, obtuse, fleshy, slightly and obliquely notched at the apex, somewhat sheathing and slightly expanded at the base. Flowers yellowish red, in many-flowered drooping racemes 23-38 cm. long; bracts 3-4 mm. long, ovate, acute; pedicels with ovary 6-20 mm. long. Sepals subequal, oblanceolate-oblong, obtuse; the lateral pair somewhat falcate. Petals as long as the sepals, oblanceolate-ovate, obtuse. Lip purplish, as long as the sepals, oblong, 3-lobed, its upper surface with 2 lamellae broken and disconnected in the middle; side-lobes long, narrow, blunt, entire, their apices pointing forward; midlobe ovate-oblong, much decurved. Column slightly thickened at the apex: anther papillose, subquadrate, the gland of the pollinia small. Capsules 5-6.3 cm. long, elliptic, ribbed.

Distribution: Nepal, Terai, and tropical Himalaya, eastwards to Sikkim, W. and S. India, Ceylon.

It furnishes salep.

VANDA R. Br.

Epiphytic herbs; stems leafy. Leaves thickly coriaceous or fleshy, flat and keeled, or terete. Flowers large and often showy, axillary, in simple lax or dense racemes, or sometimes solitary; floral bracts much shorter than the ovary. Sepals spreading or connivent, narrowed at the base. Petals like the sepals. Lip large, usually saccate or spurred at the base; side-lobes large or small (rarely obsolete), adnate to the short foot of the column or to the sides of the sac or spur; midlobe fleshy, various; disk usually ridged or lamellate, sometimes carunculate. Column short, stout, with or without a short foot; anther 2-celled; rostellum small; pollinia 2, didymous, globose, ovoid or obovoid; caudicle short and broad or long and ganiculate; gland usually large.—Species 25.– Indo-Malaya.

1. Flowers 3.2 cm. diam., golden yellow .... 1. *V. spathulata.*
2. Flowers 3.8-5 cm. diam., tesselated with brown .... 2. *V. tessellata.*

The genus is therapeutically inert.

1. **Vanda spathulata** Spreng. Syst. Veg. III, 719.

Stem about 30 cm., leafy, thicker than a swan's quill, rooting upwards; roots very stout, vermiform; tnternodes 2.5 cm., green. Leaves 5-10 by 3.2-3.8 cm., lorate, keeled, recurved, flat, tip rounded emarginate or 2-lobed; lower leaves sometimes smaller, ovate, sheath green, speckled with red. Pedicels from the middle or lower nodes, 30-45 cm., erect, robust, with a few distant short, acute sheaths, green, speckled with red. Raceme terminal, 4-5-flowered rhachis stout, bracts broadly ovate, acuminate; pedicel with ovary 2.5-3.8 cm., flowers 3.2-3.8 cm. broad; sepals and petals obovate-oblong, tips rounded; lip longer than the sepals, side-lobes small, oblong, erect, midlobe much larger, shortly clawed, triangular-ovate, tip contracted, obtuse, spur very short, conical; column very short, rostellum obscure; anthers depressed, truncate, pollinia oblong, strap short, spathulate, gland large, 2-fid. Fruit 3.8 cm., obovoid, erect, ribs thick, pedicel 2.5 cm., very stout.

Distribution: W. Peninsula from Malabar to Travancore, Ceylon.

It is supposed on the Malabar Coast to temper the bile and abate phrenzy; and the golden yellow flowers, reduced to powder, are given in consumption, asthma, and mania.

Malayalam: Ponnamponmaraiva—.

2. **Vanda tessellata** Hook. ex G. Don. in Loud. Hort. Brit. 372.—*V. Roxburghii* R. Br. in Bot. Reg. VI (1820) t. 506.—PLATE 931 (under *V. Roxburghii*).

Stem 30-60 cm. long, stout, scandent by the stout, simple or branching roots. Leaves thickly coriaceous, 15-20 by 1.3-2 cm., recurved, complicate, obtusely keeled, præmorse, with usually 2 unequal rounded lobes and an acute interposed one. Flowers in 6-10-flowered racemes reaching with the peduncle 15-25 cm. long; bracts scarious, 3 mm. long, ovate, acute; pedicels with ovary 3.8-5 cm. long. Sepals yellow, tessellated with brown lines and with white margins; lateral sepals 2.5 by 1.6 cm., obovate with subcuneate bases and with more or less waved margins; dorsal sepal as long as the lateral, 13 mm. broad, obovate-oblong. Petals yellow with brown lines and white margins, shorter than the sepals, 13 mm. wide. Lip 16 mm. long, bluish dotted with purple; side-lobes rising from the mouth of the spur 6 mm. long, ovate, acute, erect; midlobe 11 mm. long, pandurate, the lower part broadly elliptic, the apical portion quadrate, dilated at the fleshy 2-lobed tip; disk tumid, with fleshy ridges; spur straight, conical, obtuse, 6 mm. long. Column very short; pollinia ellipsoid or subglobose; caudicle short, broad; gland large. Capsules 7.5-9 cm. long, narrowly clavate-oblong with acute ribs and a short pedicel.

Distribution: Bengal, Chota Nagpur, Bihar, Central Provinces, W. Peninsula, Travancore, Ceylon.

The root is bitter; heating; alexiteric, antipyretic; useful in dyspepsia, bronchitis, inflammations, rheumatic pains, diseases of the abdomen, hiccough, tremors (Ayurveda).

The root is bitter; laxative, tonic to the liver and the brain; good for bronchitis, piles, lumbago, toothache, boils on the scalp; lessens inflammation; heals fractures (Yunani).

Rasna root is said to be fragrant, bitter and useful in rheumatism and allied disorders, in which it is prescribed in a variety of forms. It also enters into the composition of several medicated oils for external application in rheumatism and diseases of the nervous system.

In Chota Nagpur, the leaves pounded and made into a paste are applied to the body during fever, and the juice is introduced into the aural meatus as a remedy for otitis media (Campbell).

A compound decoction of this root is being administered in a case of hemiplegia as the Indian physicians consider it useful in all nervous diseases and rheumatism. . . . It has not given appreciable benefit to the patient (Koman).

The stem is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Kharkittan—; *Bengal:* Nai, Rasna—; *Bombay:* Rasna—; *Canarese:* Bandanike—; *Gujerati:* Rasno—; *Hindi:* Banda, Nai, Perasara, Persara, Rasna, Vanda—; *Marathi:* Rasna—; *Sanskrit:* Atirasa, Bhujangakshi, Chhatraki, Dronagandhika, Elaparni, Gandhanakuli, Muktarasa, Nakuleshta, Nakuli, Palankapa, Rasadhya, Rasana, Rasna, Rasya, Sarpagandha, Shreyasi, Sugandha, Sugandhimula, Surasa, Suvaha, Vandaka, Vriksharuha, Yuktarasa—; *Santal:* Darebanki—; *Telugu:* Chittiveduri, Kanapabadanika, Mardaru, Vadanika—; *Urdu:* Banda—.

SACCOLABIUM Bl.

Epiphytes; pseudobulbs 0. Leaves flat keeled or terete. Peduncels lateral; flowers usually small spicate racemed panicled or subcorymbose. Sepals and petals adnate to the base of the column, spreading, subsimilar, free. Lip sessile at the base of the column usually consisting of a large saccate or conic cylindric spur, small lateral lobes and a small midlobe; sac or spur not septate within and without a large scale or callus within under the column. Column short, broad, truncate, rarely beaked, foot 0; anther 1- or imperfectly 2- celled; pollinia 2, entire or 2-partite.—Species 50.—Indo-Malaya.

The genus is therapeutically inert.

1. **Saccolabium papillosum** Lindl. in Bot. Reg. t. 1552 (excl. syn.).—PLATE 932.

Stems 60-90 cm., stout, erect, clustered, bearing many nearly horizontal leaves. Leaves coriaceous, 7.5 10 cm. long, conduplicate, curved; apex truncate or deeply notched. Peduncle 2.5-5 cm. long, leaf-opposed, about 13 mm. long, bearing a subcorymbose 4-8-flowered raceme. Flowers 8 mm. diam.; bracts triangular. Sepals and petals yellow barred and blotched with brown. Sepals subequal, oblong, subacute, spreading. Petals narrower than sepals, subspathulate. Lip longer than sepals, adnate to the base of the column; side-lobes none; terminal lobe decurved, ovate-oblong, obtuse, crenate; upper surface transversely rugulose, white with transverse purple bars. Spur cylindric, straight, half as long as the ovary and parallel to it, cylindric or slightly tapering, pale yellow, hairy within. Column short. Anther broadly conical. Pollinia subovoid, deeply bipartite; caudicle slender, tapering to the small oblong gland. Capsule 3.2 cm. long, fusiform, ridged.

Distribution: Bengal and the lower Himalaya Mountains from Sikkim eastwards, Assam, Gangetic Delta, Tenasserim.

It is used medicinally instead of *Vanda tessellata.*

A good substitute for sarsaparilla. It is considered a specific for rheumatism.

In the Konkan, its roots are used for their cooling properties.

Malayalam: Kanbher, Rasna—; *Sanskrit:* Gandhata, Nakuli, Rasna—.

Acampe Lindl.

Epiphytic herbs; stem usually very long and stout. Leaves thickly coriaceous, keeled, distichous, oblique at the apex. Flowers corymbose, in large spreading panicles, fleshy, brittle, yellow, spotted; peduncles short, rigid, lateral; bracts broad, short, persistent. Sepals fleshy, brittle, flat; lateral sepals adnate to the usually small spur of the lip; dorsal sepal often slightly larger than the lateral ones. Petals like the sepals, straight. Lip fleshy, bent upwards, saccate or spurred, adnate to the footless column, often tuberculate and pubescent within the sac. Column short, thick, without a foot; anthers ovate, 2-celled; pollinia 2, waxy, globose; caudicle slender, linear, longer than the pollinia; gland small, subrotund.—Species 12.—Indo-Malaya, China.

The genus is therapeutically inert.

1. **Acampe wightiana** Lindl. Fol. Orchid. (1853) 2.—*Vanda Wightiana* Lindl. ex Wight Ic. t. 1670.—*Saccolabium praemorsum* Hook. f. Fl. Brit. Ind. VI, 62.—*S. Wightianum* Hook. f. l.c. 62.

Stem 30-45 cm. long, as thick as the little finger, clothed with sheaths of fallen leaves; internodes short; roots long, very stout. Leaves 10-20 by 1.6-3.2 cm., ligulate, thickly coriaceous, flat, irregularly 2-lobed at the apex, the lobes rounded, usually with an acute sinus. Flowers corymbose, in supra-axillary panicles 3.8-6.3 cm. long including the peduncle; peduncle about as long as the panicle, stout with many cupular sheaths; bracts short, broadly ovate, persistent; pedicels with ovary 3-6 mm. long. Sepals yellow, barred with red; lateral sepals 10 by 5 mm., elliptic-oblong, obtuse; dorsal sepal as long and as broad as the lateral ones, obovate-oblong, obtuse. Petals yellow, barred with red, 8 by 2.5 mm., obovate, obtuse. Lip less than 8 mm. long, white, with a few transverse red stripes; side lobes small, rounded; midlobe 4 mm. long, ovate, obtuse, fleshy; spur a short rounded sac. Pollinia 2, large, globose; caudicle short; gland small. Capsules 3.8-7.5 cm. long, sessile or nearly so, clavate, or oblong, or fusiform, with many ribs.

Distribution: Bengal, W. Peninsula, Ceylon.

The plant is a bitter tonic. It is used in rheumatism.

Canarese: Marabale—; *Malayalam:* Taliyamaravala—.

ZEUXINE Lindl.

Terrestrial herbs; stems decumbent at the base, succulent, glabrous. Leaves membranous, sometimes withering at flowering time. Flowers small, in racemes or spikes. Sepals usually subequal; lateral pair free; dorsal sepal concave and forming a hood with the petals. Petals like the dorsal sepal. Lip adnate to the base of the column, cymbiform or saccate, the apical lobe shortly clawed or sessile, divided into 2 oblong subquadrate more or less truncate divergent lobules, or entire, or with narrow decurved lobules; sac at the base with calli or laminae in side. Column very short, its anterior face with lamellar or conical processes; stigmas 2, lateral, distant; anther membranous, sometimes rigid, its cells contiguous;

pollinia pyriform, attached by an oblong gland to the erect rostellum. —Species 20.—Tropical Africa, Indo-Malaya.

The genus is therapeutically inert.

1. **Zeuxine strateumatica** Schlechter in Fedde Repert. Beih. I (1911) 77.—*Z. sulcata* Lindl. Gen. et Sp. Orchid. (1840) 485.—*Z. bracteata* Wight Ic. t. 1724 bis.—*Z. robusta* Wight Ic. t. 1726.

Whole plant 5-25 cm. high; stem passing into the peduncle, leafy, glabrous. Leaves 2.5-5 cm. by 4-6 mm., linear, acuminate, clasping, sessile on the hyaline truncate sheaths, gradually passing into linear bracts upwards. Flowers in densely-flowered racemes 1.3-5 cm. long; bracts 8 mm. long, much exceeding the ovary, ovate, caudate-acuminate, erect, membranous; pedicels very short. Sepals unequal, greenish white; lateral pair 3 by 1.6 mm. smaller than the dorsal, obliquely ovate-oblong, subobtuse; dorsal sepal 5 by 2.5 mm., concave, ovate, obtuse. Petals greenish white, slightly shorter than the dorsal sepal, 1.6 mm. broad, falcately oblong, obtuse, united with the dorsal sepal to form a hood over the column. Lip 3 mm. long, hammer-headed, yellow, with a small cymbiform sac at the base; apical lobe 1.25 by 2 mm., subquadrate, entire or emarginate at the apex. Column very short, with 2 wings at its apex covering the anther; arms of rostellum short, stout, parallel; anther depressed, very shortly beaked, covered by the wings of the column; pollinia clavate, sessile on an oblong gland.

Distribution: Throughout the greater portion of India, up to 5,000 ft., on the outer Himalayan ranges, Malay Peninsula, Ceylon.—Afghanistan, China, Japan, Java, Philippines.

The tubers are used as salep.

Bengal: Shwethuli—.

ORCHIS Linn.

Terrestrial erect leafy herbs, with entire oblong or palmately lobed tubers. Leaves sheathing, not plicate. Flowers racemed or spicate. Sepals free, subequal, lateral spreading or conniving in a hood with the petals and dorsal. Petals usually smaller. Lip shortly adnate to the column, spreading or pendulous, spurred, entire or 3-lobed. Column very short, rostellum cupular or saccate; anther adnate to the face of the column, cells parallel or converging below; pollinia 2, caudicles adnate to 1 or 2 glands, which are concealed in one pouch formed by the rostellum.—Species 70.—Europe, temperate Asia, N. Africa, America.

The following species are used in Europe for the preparation of Salep—*O. latifolia* Linn., *O. laxiflora* Lam., *O. maculata* Linn., *O. mascula* Linn., *O. militaris* Linn., *O. morio* Linn., *O. pyramidalis* Linn., *O. sambucina* Linn., *O. simia* Lam.—.

OFFICIAL :—The tuber of *Orchis spp.* in Austria, Japan, Norway, Portugal; *O. mascula* Linn. in Russia; *O. militaris* Linn. in Holland and Russia; *O. morio* Linn. in Belgium, and Russia.

1. **Orchis latifolia** Linn. Sp. Pl. (1753) 1334; Reichb. Ic. Fl. Germ. XIII, t. 50.

Tubers palmate. Stem 30-90 cm., usually fistular, leafy upward. Leaves many, 5-15 cm., erect, oblong, linear-oblong or lanceolate, tip flat or concave. Spike 2.5-15 cm., cylindric, dense-flowered; bracts green, acuminate, usually much exceeding the flowers; flowers about 17 mm. from dorsal sepal to tip of lip, dull purple, sepals and petals acute or obtuse, lateral sepals ovate, reflexed; lip oblong or rhomboid, crenate, entire or very obtusely 3-lobed, spotted with darker purple, sides deflexed, midlobe small or obsolete; spur straight or curved, stout, equalling or shorter than the ovary, pendulous.

Distribution: W. temperate Himalaya, W. Tibet 8,000—12,000 ft.—Through Afghanistan to N. Africa and the Atlantic, N. Asia.

The tuber is expectorant and astringent.

English: Marsh Orchid—; *Spanish:* Palma Christi—.

HABENARIA Willd.

Terrestrial usually leafy herbs with undivided or lobed tubers. Leaves flat with sheathing bases. Flowers spicate or racemose, usually green or yellow, or the sepals green and the petals white; bracts mostly narrow. Sepals unequal; lateral sepals more or less spreading or reflexed. Petals simple or 2-lobed or 2-partite (very rarely 3-partite), the segments usually filiform, equal or unequal. Lip continuous with the column, often shortly adnate to it, produced at the base into a short or elongated spur; limb spreading or pendulous, narrow or broad, undivided, or 3-lobed, or 3-partite. Column continuous with the ovary, not reclinate, short, footless; anther-cells parallel or diverging, forming with the side arms of the rostellum channels or tubes for the caudicles of the pollinia; pollinia granular, with short elongate caudicles and an exserted naked gland; stigma 2-lobed or extended into 2 short or elongate often clavate papillose processes; rostellum 3-lobed, the midlobe narrowly triangular, hidden between the anther-cells. Capsule ellipsoid or oblong, sometimes beaked.—Species about 500.—Cosmopolitan.

H. foliosa Reichb. fil. is used medicinally by the Zulus.

1. **Habenaria commelinifolia** Wall. ex. Lindl. Gen. et Sp. Orchid (1835) 325.

Stem 60-90 cm. high, loosely sheathed at the base. Tubers ellipsoid or cylindric. Leaves scattered, 7.5-15 cm. long, oblong or oblong-lanceolate, subcordate, acute and often subspinescent at the tips, margins pale. Spike 10-20 cm. long, many and loosely flowered; flowering bracts erect, nearly equalling the long-beaked ovary, scaberulous on both surfaces and ciliolate on the margins. Flowers 1.3-2 cm. diam., white, inodourous. Sepals scaberulous; dorsal small, saccate, with a short curved beak; lateral pair spreading, much shorter, hatchet-shaped, beaked, the veins deeply looped or arched. Petals unequally oblong, smaller than the lateral sepals. Lip divided into 3 long filiform segments, about 2.5 cm. long from its base to the tip of the mid-segment; lateral ones 3.2 cm. long, curved downwards; mid-segment channelled above, spreading, scaberulous; spur 3.8-6.3 cm. long, slender and curved downwards, its upper portion funnel-shaped and white, its apex clavate and green. Anther-cells elongate, distant, diverging at the base; tubes long, straight. Pollinia small, oval; caudicles very long, dilated upwards, translucent; glands minute. Staminodes seated on the long arms of the column and curving round in front of the anther-tubes. Stigmatic processes large, clavate, incurved; rostellum triangular.

Distribution: Outer ranges of W. Himalaya, from the Punjab to Kumaon, up to 5,000 ft., extending eastwards to Parasnath, Chota Nagpur, Bihar and Upper Burma, Central India, Konkan, W. Ghats, Deccan, N. Kanara, Bababudan Hills.

It furnishes salep.
Sadani: Jadu, Jaitjadu—.

SCITAMINACEAE.

Herbs often large, frequently with a pseudostem of convolute leaf-sheaths (rarely with a woody caudex). Leaves radical or cauline, usually membranous; sheaths generally large, clasping the stem; lamina with a strong central nerve and pinnate close secondary nerves; petioles short or 0. Flowers hermaphrodite, rarely 1-sexual (MUSA), irregular, solitary or spicate; bracts membranous or herbaceous; bracteoles membranous or 0. Perianth 2-seriate, superior; outer segments 3, calycine (rarely petaloid), free and imbricate, or connate in an entire, toothed or spathaceous tube; inner segments petaloid, connate in a long or short corolla-tube free or adnate to the petaloid staminodes; limb 3-partite, the segments free or connate. Stamens only 1 perfect, the rest replaced by petaloid staminodes, or 5 perfect with a sixth imperfect or obsolete; anthers linear, 2-celled (rarely of one cell on the margin of a petaloid connective). Ovary 3- (rarely 1- or 2-) celled, inferior; ovules many (rarely few), anatropous, axile (rarely parietal); style usually slender, with 2 short stylodes, crowning the ovary; stigma usually entire or subentire. Fruit a loculicidally 3-valved capsule, or indehiscent and membranous or fleshy, usually crowned by the remains of the perianth. Seeds often arillate; albumen floury; embryo small.—Genera about 50.—Throughout the warm regions of both hemispheres.

1. Flowering stem leafy or not. Bracts cuculate, several-flowered, forming a cone-like spike. Filament petaloid. Capsule subdehiscent .... CURCUMA.
2. Flowering stem short or erect. Filament short, connective broad not crested .... GASTROCHILUS.

3. Flowering stem leafy or not. Filament very short. Connective crested .... KAEMPFERIA.
4. Flowering stem leafy. Filament long, slender .... HEDYCHIUM.
5. Flowering scapes usually leafless. Filament short. Anther-cells diverging above. Connective dilated, crested or 2-lobed, rarely simple .... AMOMUM.
6. Spikes terminating leafy stems or leafless scapes. Filaments short. Anther-cells parallel. Connective usually produced into a long appendage .... ZINGIBER.
7. Spikes terminating leafy stems or leafless scapes. Filaments petaloid, anther adnate to its middle, cells parallel .... COSTUS.
8. Scape leafless. Panicle loosely flowering from the base upwards. Filament very short. Anther-cells parallel, connective not dilated .... ELETTARIA.
9. Spike or panicle terminating a tall leafy stem Filament long. Connective shorter than the anther or longer and dilated ...... ALPINIA.
10. Herbs with usually branched stem. Flowers pedicelled, paired on a common pedicel .... MARANTA.
11. Sepals free. Stamen 1; anther 1-celled, adnate to lateral petaloid filament. Staminodes 4. Style flattened. Stigma terminal ...... CANNA.
12. Stem subarboreous, stout, simple. Flowers in a stout terminal spike. Calyx-tube short .... MUSA.

Generally the rhizomes and the fruits are aromatic, tonic, and stimulant; occasionally they are feculent and nutritive; some yield an astringent and diaphoretic juice.

Many members enter into the composition of Malayan ipohs.

OFFICIAL :—*Alpinia officinarum* Hance (Denmark, France, Germany, Holland, Norway, Russia, Sweden, Switzerland).

Amomum Zingiber Linn.=*Zingiber officinale* Roscoe (Portugal).

Curcuma domestica Val. (Holland); *C. longa* Linn. (Belgium, France); *C. zedoaria* Roscoe (Austria, France, Germany, Hungary, Japan, Russia, Switzerland),—Roxb.=*C. aromatica* Roscoe (Portugal).

Elettaria Cardamomum Maton (Holland, Italy, United States),—White and Maton (Austria, Denmark, Hungary, Japan, Norway, Russia, Sweden, Switzerland)=*Alpinia Cardamomum* Roxb. (Portugal),—(Roxburgh) Maton (Germany, Turkey),—Maton var. *minuscula* Burkhill (Great Britain).

Hellenia chinensis Willd.=*Alpinia chinensis* Roscoe (Portugal).

Maranta arundinacea Linn. (Denmark, Holland, Portugal).

Zingiber officinale Roscoe (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Japan, Norway, Russia, Sweden, Switzerland, United States).

CURCUMA Linn.

Stemless herbs with tuberous rootstocks bearing sessile and long-stipitate tubers. Leaves usually oblong, often very large. Flowers in dense compound spikes, vernal or aestival, and preceding, or autumnal and contemporaneous with the leaves, crowned by a coma of enlarged coloured bracts; lower bracts ovate, membranous, enclosing several bracteolate fugacious flowers which open in succession. Calyx short, cylindric, minutely toothed. Corolla-tube funnel-shaped; corolla-lobes usually ovate or oblong, the upper longer and somewhat concave. Stamen 1 perfect; filament short; anthers not crested, with contiguous cells spurred at the base; lateral staminodes oblong, petaloid, connate with the filament. Lip orbicular, with a deflexed tip. Ovary 3-celled; ovules numerous on axile placentas; style filiform; stigma 2-lipped, the lips ciliate. Fruit a tardily dehiscent globose membranous 3-valved capsule. Seeds ovoid. or oblong, usually arillate.—Species 35.—Palæotropics.

A. Flower-spike vernal or aestival, distinct from the leaves and usually developed before they appear	
1. Leaves with petiole 30-45 cm.	1. *C. angustifolia.*
2. Leaves 90-120 cm.	2. *C. aromatica.*
3. Leaves 30-60 cm.	3. *C. zedoaria.*
4. Leaves large, oblong, with a broad purple-brown cloud down the middle	4. *C. caesia.*
B. Flower-spike autumnal, in the centre of the tuft of leaves. Bracts not recurved at the tip	
1. Leafy tuft 60-90 cm.	5. *C. amada.*
2. Leafy tuft 120-150 cm.	6. *C. longa.*

The rhizome is aromatic, stomachic, and carminative.

The following species are used medicinally in China, Cambodia, the Philippine Islands, Madagascar, Brazil—*C. longa* Linn.—; in Indo China—*C. xanthorrhiza* Roxb., *C. zedoaria* Roscoe—; in Malaya—*C. longa* Linn., *C. xanthorrhiza* Roxb.—; in Java—*C. domestica* Val., *C. viridiflora* Roxb., *C. zedoaria* Roscoe.—.

OFFICIAL :—The rhizome of *C. domestica* Val. (Holland), *C. longa* Linn. (Belgium, France), *C. zedoaria* Roscoe (Austria, France, Germany, Hungary, Japan, Russia, Switzerland),—Roxb.= *C. aromatica*. Roscoe (Portugal).

1. **Curcuma angustifolia** Roxb. in As. Res. XI (1810) 338, t. 3.—Plate 934A.

Rootstock small, emitting long fleshy fibres terminating in pale oblong pendulous tubers. Leaves (with petiole) 30-45 cm.; blade lanceolate, acute, 15-30 cm. long. Flowering spike lateral, apart from and usually appearing earlier than the leafy spike, crowned by several enlarged empty pink bracts. Flowers yellow, longer than their bracts, 3 or 4 together in the axil of each bract opening in succession and quickly fading; sheaths of pseudostem pale green. Calyx 3-toothed. Corolla-tube 13 mm. long, somewhat gibbous; upper lobe erect, concave, ovate, longer than the 2 lateral ones. Lateral staminodes oblong, united to the filament; the lower large, broad, spreading, notched; connective produced at the base in a fork. Capsule ovoid, ultimately opening by 3 valves. Seeds many, small.

Distribution : Outer ranges of Central Himalaya, W. Bihar, N. Bengal, extending to Bombay and S. India.

The root is sweetish, fragrant, cooling, oleagenous; tonic, aphrodisiac; useful in consumption, biliousness, leprosy, burning sensations, dyspepsia, loss of taste, bronchitis, asthma, fever, thirst, jaundice, anaemia, leucoderma, stones in the kidney and the bladder, strangury, urinary discharges, ulcers, diseases of the blood (Ayurveda).

The root is demulcent, non-irritating, nutritive. It is well suited for infants and convalescents.

Bombay: Tickar—; *Canarese:* Koovehittu—; *Deccan:* Ararutkegadde—; *English:* East Indian Arrowroot, Narrow-leaved Turmeric, Wild Arrowroot—; *Gujerati:* Tavakhara—; *Hindi:* Tavakhira, Tikhur—; *Marathi:* Tavakhira, Tavakila—; *North Kanara:* Kuvegadde—; *Persian:* Tavashira—; *Sanskrit:* Gavayodbhava, Godhumaja, Payakshira, Pishtika, Talakshira, Talasambhuta, Tandulodbhava, Tavakshira, Yavaja—; *Tamil:* Ararutkilangu, Kua—; *Telugu:* Ararutgaddalu—.

2. **Curcuma aromatica** Salisb. Parad. Lond. (1805) t. 96; Wight. Ic. t. 2005.—PLATE 935.

Rootstock large, of palmately branched, sessile annulate biennial tubers yellow and aromatic inside. Leaves 38-60 by 10-20 cm., oblong-elliptic or oblong-lanceolate, caudate-acuminate, green, often variegated above, pubescent beneath, base deltoid; petioles as long as or longer than the blade. Flowering stem appearing with or before the leafing stem, as thick as the forefinger, sheathed. Flowers fragrant, shorter than the bracts, in spikes 15-30 cm. long; flowering bracts 3.8-5 cm. long, ovate, recurved, cymbiform, rounded at the tip, pale green, connate below forming pouches for the flowers; bracts of the coma 5-7.5 cm. long, more or less tinged with red or pink. Calyx 8 mm. long, irregularly 3-lobed. Corolla-tube 2.5 cm. long, the upper half funnel-shaped; lobes pale rose-coloured, the lateral lobes oblong, the dorsal longer, ovate, concave, arching over the anthers. Lip yellow, obovate, deflexed, subentire or obscurely 3-lobed. Lateral staminodes oblong, obtuse, as long as the corolla-lobes.

Distribution : Bengal, W. Peninsula, sometimes cultivated.

The rhizome is bitter; appetiser; useful in leucoderma and diseases of the blood (Ayurveda).

The rhizome is considered tonic and carminative.

In the Konkan, it is applied to promote the eruption of exanthematous fevers; it is seldom used alone, but is combined with astringents when applied to bruises, and with bitters and aromatics to promote eruptions.

It is used externally in scabies and the eruption of small-pox. Rubbed into a paste with benzoin it is a common domestic application to the forehead for headache.

The Muhammedans suppose it to be a valuable medicine in certain cases of snake-bite, administered in small doses and in conjunction with golden-coloured orpiment, *Costus arabicus*, and *Carum copticum*.

The rhizome is not an antidote to snake-venom (Mhaskar and Caius).

The essential oil from the rhizomes has been studied by Sanjivarao, Shintre, and Simonsen (*Journn. Ind. Inst. Sc.;* IX,(A), 1926).

Arabic: Judwar—; *Bengal:* Banhalud—; *Bombay:* Ambehaldi, Ranhald—; *Burma:* Kiyasanoin—; *Canarese:* Kasturiarishina—; *English:* Cochin Turmeric, Wild Turmeric, Yellow Zedoary—; *Gujerati:* Kapurkachali, Vanahaladara—; *Hasada:* Birsasang—; *Hindi:* Banhaldi, Banharidra, Janglihaldi—; *Konkani:* Ranhallad—; *Malayalam:* Anakuva, Kattumannar—; *Marathi:* Ranahalada, Sholi—; *Mundari:* Hatubundusasang—; *Naguri:* Bundusasang—; *Portuguese:* Zedoaria amarella—; *Sadani:* Bonhaldi—; *Sanskrit:* Aranyaharidra, Sholi, Sholika, Vanahaladi, Vanaharidra, Vanarishta—; *Sinhalese:* Dudakaha, Walkaha—; *Tamil:* Kasturimanjal—; Kattumannal—.

3. **Curcuma zedoaria** Rosc. Monandr. Pl. (1828) 109.—PLATE 934B.

Rootstock of palmately branched sessile cylindric oblong annulate tubers, pale yellow inside, with a camphoraceous odour and bitterish spicy taste, also bearing long fleshy fibres that terminate in smaller oblong less fragrant tubers. Leaves 4-6 with long petioles 30-60 cm. long, oblong-lanceolate, finely acuminate, glabrous on both surfaces, clouded with purple down the middle. Flowering stem 20-25 cm. long, appearing before the leaves, stout, clothed with obtuse sheaths. Flowers yellow in spikes 7.5-12.5 by 5-7.5 cm.; flowering bracts 3.8 cm. long, ovate, recurved, cymbiform, green tinged with red; bracts of the coma reaching 5 cm. long, crimson or purple. Calyx 8 mm. long, obtusely 3-toothed. Corolla-tube twice as long as the calyx, funnel-shaped; lateral lobes oblong, the dorsal lobe larger, vaulted, arching over the anther. Lip 13 mm. broad, suborbicular, deflexed, obscurely 3-lobed, deep yellow. Capsule ovoid, 3-gonous, thin, smooth, bursting irregularly. Seeds ellipsoid with a white lacerate aril.

Distribution : Said to be wild in the E. Himalaya and in Chittagong. Cultivated more or less throughout India.

The rhizome is pungent, bitter, fragrant; heating; appetiser; vulnerary, anthelmintic, antipyretic, alexiteric; destroys foulness of

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the breath; useful in leucoderma, piles, bronchitis, asthma, tumours, tuberculous glands of the neck, enlargement of the spleen, epileptic seizure (Ayurveda).

The rhizome has a bitter, sharp, hot taste, and a good odour; laxative, tonic to the brain and the heart, aphrodisiac, alexipharmic, emetic, emmenagogue, expectorant, carminative; useful in gripping of children, pains, inflammations, toothache (Yunani).

The fresh root is considered to be cooling and diuretic, it checks leucorrhœal and gonorrhœal discharges and purifies the blood. The juice of the leaves is given in dropsy (Rheede).

The rhizomes possess aromatic, stimulant and carminative properties. Employed as a stomachic, and also applied to bruises and sprains. The root is chewed to correct a sticky taste in the mouth; it is also an ingredient in some of the strengthening conserves which are taken by women to remove weakness after child-birth. In colds it is given in decoction with long pepper, cinnamon and honey, and the pounded root applied as a paste to the body.

The rhizome is used internally in Cambodia as a stimulant, tonic, and depurative; it is administered in the form of a tincture in malaise and vertigo, and given three times daily to women during the two weeks which follow delivery. The corms are chewed by Cambodian mothers who then apply them together with their saliva to the head and body of children suffering from convulsions. The leaves are used as plasters in lymphangitis, furunculosis, and adinites.

The rhizome is not an antidote to scorpion-venom (Caius and Mhaskar).

The essential oil from the rhizome has been studied by Sanjivarao, Sudborough, and Watson (*Journ. Ind. Ins. Sc.;* VIII (A) 1925), and later by Sanjivarao, Shintre and Simonsen (*ibid.;* XI (A), 1928).

Arabic: Zurambad—; *Bengal:* Ekangi, Kachura, Sati, Shori—; *Bombay:* Kachura—; *Burma:* Thanuwen—; *Cambodia:* Prateal vong preah atit—; *Canarese:* Kachora—; *Dutch:* Ronde zedoar—; *English:* Zedoary—; *French:* Zedoaire, Zedoaire bulbeux, Zedoire—; *German:* Zedoarwurzel, Zittwer—; *Gujerati:* Kachuri—; *Hindi:* Kachura, Kalihaladi—; *Italian:* Zedoaria—; *Java:* Temoelawa—;

Malayalam: Kachcholam, Kachchurikizhanna, Pulakizhanna—; *Marathi:* Kachari, Kachora, Narakachora—; *Persian:* Kazhur, Urukelkafur—; *Portuguese:* Zedoaria—; *Russian:* Tzitvar—; *Sanskrit:* Dravida, Durlabha, Gandhamulaka, Gandhasara, Jatala, Kalpaka, Karchura, Karshya, Mukhya, Shathi, Vedhya—; *Sinhalese:* Harankaha—; *Spanish:* Zedoaria—; *Tamil:* Kichilikilhangu, Pulankilhangu—; *Telugu:* Kachoram, Kichchiligaddalu—; *Urdu:* Kachura—.

4. **Curcuma caesia** Roxb. in As. Res. XI (1810) 334.—Plate 936.

Whole height about 1.2 m. Leaves 30-60 by 12.5-15 cm. broadly lanceolate or oblong, glabrous, with a deep ferruginous purple cloud down the middle which penetrates to the lower surface. Petiole and sheath about as long as the blade. Spikes appearing rather before the leaves, about 15 cm. long or altogether about 30 cm. high with the peduncle. Flowering bracts green with a ferruginous tinge. Coma deep bright red, tending to crimson. Flowers pale yellow, reddish at the outer border, rather shorter than their bracts.

Distribution : Bengal.

The medicinal properties are the same as those of *C. Zedoaria* (Ayurveda), *Zingiber zerumbet* (Yunani).

The Turkomans employ these roots as a rubefacient, to rub their bodies down with after taking a Turkish bath.

In Bengal, it is used in the fresh state like turmeric.

Bengal: Kalahaldi, Kaloholud, Nilkantha—; *Bombay:* Narkachura—; *English:* Black Zedoary—; *Hindi:* Kalihaldi, Narkachura—; *Marathi:* Kalihalada—; *Telugu:* Manupasupu—; *Visayan:* Lampuyangdorac, Lampuyangtapol—.

5. **Curcuma amada** Roxb. in As. Res. XI (1810) 341.—Plate 937A.

Rootstock large; sessile tubers thick, cylindric or ellipsoid, pale yellow inside. Leaves long-petiolate, in tufts, the blade 30-45 by 7.5-12.5 cm., oblong-lanceolate, acute or acuminate, narrowed to the base, glabrous and green on both sides; petioles as long as the leaf-blade (30-45 cm.). Flowers in autumnal spikes 7.5-15 by 3.8-5 cm., in the centre of the tuft of leaves; peduncle 15 cm. long or more; flowering bracts 2.5 cm. long, greenish white; bracts of the coma longer and narrower, tinged with pink or red. Calyx nearly 13 mm. long, obtusely 3-toothed. Corolla white or very pale yellow; tube about 2.5 cm. long; lobes oblong, acute. Lip semielliptic, yellow, 3-lobed, the middle lobe emarginate.

Distribution: Bengal, Malay Peninsula, W. Peninsula.—Malay Archipelago.

The rhizome is sweet, bitter, cooling; appetiser; alexiteric, antipyretic, aphrodisiac, laxative; causes "vata"; useful in biliousness, all kinds of itching and skin diseases, bronchitis, asthma, hiccough, inflammations due to injuries (Ayurveda).

The root has a bitter sharp taste; diuretic, maturant, emollient, expectorant, antipyretic; appetiser; useful in inflammations, troubles in the mouth and the ear, gleet, ulcers on penis, scabies, lumbago, stomatitis (Yunani).

The roots are expectorant and astringent, useful in diarrhoea and gleet.

The rhizomes are cooling and useful in prurigo. They are topically applied over contusions and sprains. They are also used as stomachic and carminative.

Arabic: Daruhaladi—; *Bengal:* Amada—; *Canarese:* Ambahaldi—; *Deccan:* Amkiadrak, Bokiadrak—; *English:* Mango Ginger—; *Gujarat:* Ambahaldara—; *Hindi:* Amhaldi, Kapurahaladi—; *Marathi:* Ambahaladi—; *Naguri:* Bundusasang—; *Persian:* Darchuha—; *Sanskrit:* Amragandha, Daru, Darvimeda, Karpura, Karpuraharidra, Padmapatra, Surabhidaru, Suranayika—; *Telugu:* Mamidiallam—; *Urdu:* Ambahaladi—.

6. **Curcuma longa** Linn. Sp. Pl. (1753) 2.—Plate 937B.

A tall herb. Rootstock large, ovoid, with sessile cylindric tubers orange-coloured inside. Leaves very large, in tufts up to 1.2 m. or more long, including the petiole which is about as long as the blade, oblong-lanceolate, tapering to the base. Flowers in autumnal spikes, 10-15 cm. long; peduncle 15 cm. or more, concealed by the sheathing petiole; flowering bracts pale green; bracts of coma tinged with pink.

Distribution: Cultivated throughout the tropics.—Believed to be indigenous in Bihar 4,000—5,000 ft.

The rhizome is pungent, bitter, heating; laxative, anthelmintic, vulnerary, tonic, alexiteric, emollient; improves the complexion; useful in "kapha" and "vata", diseases of the blood, leucoderma, scabies, urinary discharges, inflammations, ozoena, bad taste in the mouth, biliousness, dyspepsia, elephantiasis, snake-bite, smallpox, swellings, boils, bruises, sprains (Ayurveda).

The rhizome is bitter; carminative, maturant, diuretic; good for affections of the liver and jaundice, urinary discharges, scabies, bruises (Yunani).

The rhizome is used as a stimulant; externally applied in pains and bruises, and internally administered in disorders of the blood. Its use as an external applicant in bruises, leech bites, etc., is perhaps its most frequent medicinal application. The fresh juice is said to be an anthelmintic. A decoction of the rhizomes is applied to relieve catarrh and purulent ophthalmia.

The Muhammadans use turmeric medicinally in the same manner as the Hindus; they also prescribe it in affections of the liver and jaundice on account of its yellow colour.

A decoction of turmeric in purulent conjunctivitis is very effectual in relieving the pain. In Coryza the fumes of burning turmeric directed into the nostrils cause a copious mucous discharge and relieve the congestion.

Turmeric is given in the diarrhœas which are so troublesome and difficult to subdue in atonic subjects (Murray).

It is employed in intermittent fevers and dropsy. It contains much essential oil and starch and acts as a stimulant and aromatic tonic (Baden Powell).

The root, parched, and powdered, is given in bronchitis; the fumes are used during hysteric fits.

The smoke produced by sprinkling powdered *haldi* over burnt charcoal will relieve scorpion sting when the part affected is exposed to the smoke for a few minutes. A paste made of fresh rhizome is applied on the head in cases of vertigo.

Turmeric and alum in the proportion of 1 to 20, is blown into the ear in chronic otorrhœa.

A paste made of the flowers is used in ringworm and other parasitic skin diseases, and also in the treatment of gonorrhœa.

The rhizome is used externally in China and Cambodia for cutaneous affections; and internally against colic, amenorrhœa, and congestions. In Cambodia, the leaves are considered antipyretic.

In Madagascar, the rhizome is used as a tonic, stimulant, aperient, carminative, cordial, emmenagogue, astringent, detergent, diuretic, and maturant.

Turmeric, though a popular remedy for snake-bite and scorpion-sting, is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Aurukesafur, Kurkum, Urukessabaghin, Urukessubr, Urukessufr, Zarsud—; *Bengal:* Haldi, Pitras—; *Burma:* Hsanwen, Sanae, Tanun—; *Cambodia:* Banley, Ponly, Romiet—; *Canarese:* Arishina—; *Cantonese:* Wong Keung, Yuet Kam—; *Chinese:* Chiang Huang, Kiang Houang, Yu Chin—; *English:* Indian Saffron, Turmeric—; *French:* Curcuma, Safran des Indes, Souchet des Indes, Souchet long, Souchet odorant, Terre-mérite—; *German:* Gelbwurzel, Kurkuma—; *Gujerati:* Halada—; *Hausa:* Gangamau—; *Hebrew:* Kurkum—; *Hindi:* Haldi—; *Ilocano:* Culiao, Cunig—; *Italian:* Curcuma—; *Konkani:* Halad, Ollod, Ollodi—; *Madagascar:* Tamotamo—; *Malaya:* Wat kam, Wong keong—; *Malayalam:* Mannal, Marinalu—; *Marathi:* Halede—; *Mundari:* Hatusasang—; *Pampangan:* Angai, Culalao, Pangas—; *Persian:* Darzardi, Zardchobah, Zardchubah—; *Portuguese:* Acafrao da India—; *Punjab:* Haldar, Halja—; *Sanskrit:* Aneshta, Bahula, Bhadra, Dirgharaga, Gandhapalashika, Gauri, Gharshani, Haladi, Haridra, Harita, Hemaragi, Hemaragini, Hridvilasini, Jayanti, Jvarantika, Kanchani, Kaveri, Krimighni, Kshanada, Kshapa, Lakshmi, Mangalaprada, Mangalya, Mehaghni, Nisha, Nishakhya, Nishavha, Pavitra, Pinga, Pinja, Pita, Pitavaluka, Pitika, Rabhangavasa, Ranjani, Ratrinamika, Shifa, Shiva Shobhana, Shyma, Subhagavhaya, Suvarna, Suvarnavarna, Tamasini, Uma, Vara, Varangi, Varavarnini, Varnadatri, Varnavati, Varnini, Vishaghni, Yamini, Yoshitapriya, Yuvati—; *Sinhalese:* Kaha—;

Spanish: Curcuma—; *Tagalog:* Dilao—; *Tamil:* Manjal—; *Telugu:* Pampi, Pasupu—; *Urdu:* Haladi—; *Visayan:* Calanag, Calavaga, Dulao, Quinamboy—; *Zambales:* Lisangay—.

KAEMPFERIA Linn.

Herbs with short stems or stemless; rootstock often tuberous Leaves few. Flowers spicate, on radical scapes or at the apex of the leafy stem. Calyx short, cylindric, splitting spathaceously. Petals 3, connate in a corolla with a long slender tube; corolla-lobes equal, usually spreading. Stamen 1 perfect; filament short, arcuate; anther 2-celled, the cells discrete, on a wide connective which is produced above into a petaloid crest, not spurred below; lateral staminodes broad, petaloid. Lip broad, usually 2-fid. Ovary 3-celled; ovules many on 3 axile placentas; style long, filiform; stigma turbinate. Fruit an oblong capsule with thin pericarp. Seeds subglobose, with a small lacerate aril.—Species 55.—Tropical Asia and Africa.

A. Stemless. Leaves contemporary with the flowers. Spike central, radical. Lip usually bifid
  1. Leaves suborbicular, subsessile .... 1. *K. galanga.*
  2. Leaves ascending, lanceolate .... 2. *K. angustifolia.*
B. Stemless. Leaves not produced till after the flowers. Spikes radical. Lip and anthercrest bifid .... 3. *K. rotunda.*

The rhizome is stomachic, cholagogue, and carminative.

The following species are used medicinally in China and Indo China—*K. galanga* Linn., *K. pandurata* Roxb.—; in Malaya—*K. pandurata* Roxb.—; in Guinea—*K. aethiopica* Solms.—.

K. galanga enters into the composition of Malayan ipohs.

1. **Kaempferia galanga** Linn. Sp. Pl. (1753) 2; Wight Ic. t. 899.—PLATE 938.

Rootstock tuberous, aromatic; root-fibres fleshy, cylindric, not aromatic. Leaves 2, spreading horizontally, lying flat on the surface of the ground, 6.3-12.5 by 4.5-9 cm., rotund-ovate, deltoid-acuminate, thin, deep green, 10-12-ribbed, the margins not thickened nor coloured; petioles short, channelled. Flowers 6-12 from the centre of the plant between the leaves, fugacious, fragrant, opening successively; bracts lanceolate, green, short. Calyx as long as the outer bracts. Corolla-tube 2.5 cm. long; lobes lanceolate, pure white, a little shorter than the tube. Lateral staminodes 1·2 cm. long, cuneate-obovate, white. Lip rather more than 2.5 cm. long and nearly 2.5 cm. broad, deeply 2-lobed, the lobes with a lilac spot at the base. Connective produced into a quadrate 2-lobed appendage.

Distribution : More or less throughout India. Cultivated.

The tubers, reduced to powder and mixed with honey, are given in coughs and pectoral affections.

Boiled in oil the tuber is externally applied to stoppages of the nasal organs (Rheede).

The essential oil from the rhizomes has been studied by Bhaskara Panicker, Sanjivarao, and Simonsen (*Journ. Ind. Inst. Sc.;* IX, (A), 1926).

Annam: Tam nai, Thien lien—; *Bengal:* Chandumula, Humula—; *Burma:* Khamung—; *Cambodia:* Prao—; *Canarese:* Kachchura—; *Chinese:* Shan Nai—; *French:* Herbe à Kemfer, Herbe au mal d'estomac—; *Hindi:* Chandramula—; *Malay:* Konkior, Kontior, Kontye—; *Malayalam:* Katjulam—; *Marathi:* Kachri, Kapurkachri—; *Pampangan:* Cursol—; *Sanskrit:* Chandramulika—; *Sinhalese:* Hingurupriyali—; *Tagalog:* Duso, Dusul, Guisol—; *Tamil:* Kacholum—; *Telugu:* Kachoram—; *Visayan:* Cosol, Cuisol, Cusol, Cusul, Guisul, Quisol—; *Zambales:* Dosol—.

2. **Kaempferia angustifolia** Rosc. in Trans. Linn. Soc. VIII 351.—Plate 939.

Tuberous-rooted with ascending lanceolate leaves 15-20 cm. long by 2.5 cm. broad. Flowers white with lilac lip deeply cut into 2 obovate lobes. Corolla-tube 5 cm., petals 2.5 cm. Anther-crest quadrate with suborbicular lobes.

Distribution : Foot of E. Himalaya, Bengal.—Malay Islands.

The people of Bengal use the roots as a medicine for their cattle (Roxburgh).

Bengal: Kanjanbura, Mudunirbisha—; *Hindi:* Kanjanbura, Mudunirbisha—.

3. **Kaempferia rotunda** Linn. Sp. Pl. (1753) 3; Wight Ic. t. 2029.—Plate 940.

Rootstock tuberous with large erect oblong or ovate-lanceolate leaves 30 by 7.5-10 cm., usually variegated with darker and lighter green above and tinged purple beneath. Flowers fragrant, borne 2.5-7.5 cm. from the ground only, in a crowded radical spike, but only 1 or 2 opening at a time. Corolla-tube 5-7.5 cm. long with spreading linear petals nearly as long as the tube. Staminodes oblong acute white, 3.8-5 cm. Lip lilac or reddish, rather shorter, 2-fid, segments suborbicular. Anther-crest deeply 2-fid, lobes lanceolate.

Distribution: Throughout India from the Himalayas to Ceylon and the Malay Peninsula.—Malay Islands.

According to Sanskrit writers the root, used in the form of a poultice, promotes suppuration.

The whole plant, when reduced to powder and used in the form of an ointment, has wonderful efficacy in healing fresh wounds; and, taken internally, it removes any coagulated blood or purulent matter that may be within the body.

The root is a useful medicine in anasarcous swellings. In the Gazetteer of the Rewa-Kanta District, it is stated that the roots are stomachic and are also applied to swellings. The belief that the rhizomes are useful in reducing swellings is universal in India.

In Bombay, a powder of the tubers is used as a popular local application in mumps.

Bengal: Bhuichampa—; *Burma:* Myaebantouk, Myaepadouk—; *Canarese:* Nelasampige—; *Cochin China:* Nagai mio—; *Gujerati:* Bhuichampo—; *Hindi:* Bhuichampa—; *Java:* Kuntshi—; *Konkani:* Buimchampo—; *Malay:* Malankua—; *Marathi:* Bhuichampa—; *Mundari:* Japarara—; *Porebunder:* Bhuchampak—; *Portuguese:* Tulipa—; *Sadani:* Bhuicapa—; *Sanskrit:* Bhuchampaka, Bhumichampa—; *Sinhalese:* Lukenda, Yawakenda—; *Telugu:* Kondakalava—.

GASTROCHILUS Wall.

Small herbs with rhizome. Stems short or long or none. Leaves lanceolate or ovate, petioled, erect solitary or 3 or 4 in a tuft. Spikes axillary or from the rhizome; bracts numerous. Flowers thin, opening singly, white, yellow or red. Calyx tubular, spathaceous. Corolla-tube long and slender, lobes oblong or lanceolate. Staminodes similar or larger. Lip oblong or obcuneate, usually saccate or convolute, entire, lobed. Stamen filament thick fleshy; anther oblong, crest rounded or lobed or 0.—Species about 30.—Indo-Malaya, Siam.

The genus is therapeutically inert.

1. **Gastrochilus pandurata** Ridley Journ. Roy. As. Soc, S. Br. XXXII, 113.—*Kaempferia pandurata* Roxb. in As. Res. XI (1810) 328, t. 2.

Stemless; rootstock horizontal, bright yellow within, with many nodose branches and thick succulent vermiform root-fibres. Leaves few (usually 3 or 4), 23-38 by 4.5-10 cm., distichous, erect, elliptic-oblong, acute or shortly acuminate, decurrent into a long deeply channelled petiole which reaches 15 cm. long, glabrous and green on both surfaces; midrib stout; ligule short, acute, membranous. Flowers in terminal spikes, subsessile among the leaves; bracts about 5 cm. long, linear-lanceolate. Calyx-tube about 2.5 cm. long, cylindric, narrow, hyaline, 2-fid. Corolla-tube reaching 5 cm. long, or more, white or pale pink, very slender, cylindric, erect or curved at the top; segments pink, 2 cm. long, oblong, acute, spreading. Staminodes 3, oblong or lanceolate, spreading, the 2 lateral 13 mm. long, equal. Lip 2 cm. broad, elliptic-panduriform, undulate, white tinged with red. Anther erect, recurved; connective produced into a quadrate short 2-fid appendage.

Distribution : Burma, Andamans, Konkan, Malay Peninsula.—Malay Archipelago, Java.

The roots are used in dysentery (Rheede).

Malay: Temu Kinchi—.

HEDYCHIUM Koenig.

Herbs with perennial tuberous rootstocks; root-fibres hardly thickened; stem elongate, leafy. Leaves distichous, oblong or lanceolate. Flowers usually in terminal spikes; bracts oblong, subcoriaceous, 1 or more-flowered. Calyx tubular, 3-toothed. Corolla-tube long, slender; lobes equal, linear, spreading. Perfect stamen 1; lateral staminodes linear or cuneate-oblong. Lip large, 2-fid. Ovary 3-celled; ovules many, superposed on axile placentas; style long, filiform; stigma subglobose. Fruit a globose 3-valved capsule. Seeds many, small, with a lacerate aril.—Species 50.—Tropical Asia, Madagascar.

The genus is not therapeutically defined.

1. **Hedychium spicatum** Ham. ex Smith in Rees Cyclop. XVII, no. 3.—PLATE 941A.

Leaves reaching 30 cm. or more, oblong or oblong-lanceolate, very variable in breadth, glabrous. Spike sometimes 30 cm., dense-flowered; bracts large, oblong, obtuse, green, 2.5-3.8 by 2 cm. broad, 1-flowered; calyx shorter than the bract; flowers white, ascending and closely imbricate in the type. Corolla-tube 5-6.3 cm.; segments 2.5 cm., linear; staminodes 2.5 cm., lanceolate, lip cuneate, deeply bifid, 13-20 mm. broad, not at all clawed, lobes 2, rounded; stamen rather shorter than the lip; filament pale red; anther linear, 6-8.5 mm. Capsule glabrous, globose.

Distribution: Subtropical Himalaya, Nepal, Kumaon, 5,000—7,000 ft.

The rootstock is acrid, bitter, pungent, heating; astringent; useful in inflammations, asthma, pains, foul breath, bronchitis, hiccough, vomiting, "tridosha", diseases of the blood (Ayurveda).

The rootstock is laxative, tonic to the brain, emmenagogue, expectorant, carminative; good in liver complaints, vomiting, diarrhœa, inflammations and pains (Yunani).

The rootstocks are used as a stomachic, carminative, tonic, and stimulant.

The root is not an antidote to snake-venom (Mhaskar and Caius).

Arabic: Jharanbaja—; *Bengal:* Ada, Arna, Gandhashati, Shati—; *Bombay:* Sir, Sutti—; *Canarese:* Gandhashati—; *Gujerati:* Kapurkachari—; *Hindi:* Gandhapalashi, Kapurakachari, Kapurkachri, Sitruti—; *Marathi:* Kapurakachari, Sonatakka—; *North-West Provinces:* Banhaldi, Kachurkacha, Kapurkachri—; *Punjab:* Banhaldi, Bankela, Kachurkachu, Khor, Saki, Shalwi, Sheduri—; *Sanskrit:* Amlaharidra, Amlanisha, Durva. Gandha, Gandhamulika, Gandhapalashi, Gandharika, Gandhasati, Gandhavadhu, Gandholi, Gandhori, Haimi, Himaja, Himodbhava, Jimutamula, Kachhora, Karbura, Karchura, Karpura, Palashasathi, Palashi, Prithupalashika, Samudra, Saumya, Shadugrantha, Shathi, Sugandha, Sugandhamula, Sugandhasati, Suvata, Tuni—; *Tamil:* Simaikkichilikkilhangu—; *Urdu:* Kapurakachari—.

AMOMUM Linn.

Herbs with elongate leafy stems and perennial extensive rootstocks. Leaves usually oblong-lanceolate. Flowers in dense spikes direct from the rootstock; bracts imbricate. Calyx cylindric, 3-toothed. Corolla-tube cylindric; lobes 3, oblong or linear-oblong, the upper often broader and more convex. Stamen 1 perfect; filament short, arcuate; anther 2-celled, the cells divaricate, sometimes hairy, often with a petaloid crest; lateral staminodes minute or obsolete. Lip broad or ligulate. Ovary 3-celled; ovules many, superposed; placentas axile; style filiform; stigma small, subglobose, or larger and dorsally gibbous. Fruit indehiscent or bursting irregularly sometimes beaked or winged or echinate. Seeds globose or truncate.—Species 100.—Palæotropics.

1. Leaves lanceolate, glabrous. Spike globose, few-flowered	1. *A. xanthioides.*
2. Leaves oblong-lanceolate, glabrous beneath. Spike globose	2. *A. subulatum.*
3. Leaves oblong-lanceolate, glabrous beneath. Spike globose. Outer bracts small, ovate	3. *A. aromaticum.*
4. Leaves oblong-lanceolate, pubescent beneath. Spike oblong ...	4. *A. costatum.*

Seeds aromatic, stimulant, and carminative.

The following species are used medicinally in China—*A. amarum* F. P. Smith, *A. costatum* Benth., *A. xanthioides* Wall.—; in Cambodia —*A. krervanh* Pierre—; in Malaya—*A. amarum* F. P. Smith, *A. aromaticum* Roxb., *A. echinosphaera* K. Schum., *A. krervanh* Pierre, *A. xanthioides* Wall.—; in the Malay Archipelago—*A. maximum* Roxb.—; in the Gold Coast—*A. granumparadisi* Linn., *A melegueta* Rosc.—; in Madagascar and Mauritius—*A. angustifolium* Sounerat—; in Guinea—*A. cereum* Hook. f., *A. melegueta* Rosc., *A. stipulatum* Gagnep.—.

Several species enter into the composition of Malayan ipohs.

The rhizome of *A. zingiber* Linn. (*Zingiber officinale* Roscoe) is officinal in Portugal.

1. **Amomum xanthioides** Wall. Cat. 6557.—PLATE 941B.

Leafy stem, 1.5-1.8 m. Leaves 30-45 by 3.8-7.5 cm., lanceolate, glabrous, firm, bright green. Spike 2.5 cm., globose, few-flowered, shortly peduncled; peduncle arcuate, slender, 5-7.5 cm.; outer bracts 1.3-2 cm., oblong, acute, glabrous. Corolla-tube under 2.5 cm.; segments oblong, 8-13 mm. Lip with an orbicular blade 1.3-2 cm. broad, cochleariform, bifid, longer than the corolla-segments, narrowed suddenly to a broad claw; anther-crest short, broad, entire, auricled on each side. Capsule echinate, rigid, oblong-trigonous, pale brown, under 2.5 cm. long.

Distribution : Tavoy, Tenasserim.

The seeds are stimulant and carminative, and are useful in all the affections in which the common cardamoms are indicated. They are also of great service in relieving tormina and tenesmus, and even frequency of motions, in some cases of dysentery, and, for this purpose, they must always be used in powder with butter.

The seeds are used by the Chinese as a condiment, and for their tonic, stomachic, and carminative properties.

Bengal: Elach—; *Chinese:* So Sha Mi—; *Hindi:* Ilayechi—; *Malaya:* Sai yin—; *Marathi:* Elachi—; *Tamil:* Elam—; *Telugu:* Elakulu—.

2. **Amomum subulatum** Roxb. Corom. Pl. t. 277.—PLATE 942.

Leafy stem, 0.9-1.2 m. Leaves 30-60 by 7.5-10 cm., oblong-lanceolate, green, glabrous on both surfaces. Spike globose, very dense, shortly peduncled, 5-7.5 cm.; bracts red-brown, obtuse, outer 2.5 cm., ovate, with a horny cusp, inner shorter. Calyx and corolla-tube 2.5 cm.; segments subobtuse, shorter than the tube, upper cuspidate. Lip obovate-cuneate, emarginate, yellowish white, rather longer than the corolla-segments. Filament very short; anther-crest small, truncate, entire. Capsule 2.5 cm., globose, red-brown, densely echinate.

Distribution : E. Himalaya.

The seeds are pungent with a pleasant taste; heating; stomachic, alexipharmic; useful in "kapha" and "vata", indigestion, vomiting, enlarged spleen, thirst, itching, biliousness, abdominal pains, diseases of the rectum, the mouth, and the head (Ayurveda).

The seeds have a sharp good taste; stomachic, tonic to the heart and the liver, astringent to the bowels, hypnotic; appetiser, cause belching.—The outside covering is good for headache and for the teeth; heals stomatitis (Yunani).

The seeds yield a medicinal oil. It is an agreeable, aromatic stimulant. It acts as a stomachic, and is said to allay irritability of the stomach produced either by cholera or some other affections.

The decoction of the seed is used as a gargle in affections of the teeth and gums. In combination with the seeds of melons it is used as a diuretic in cases of gravel of the kidneys. In certain disorders of the digestive system, marked by scanty and viscid secretion from the intestines, it promotes elimination of bile, and is useful in congestion of the liver.

The seeds are used in gonorrhœa as an aphrodisiac. They have been found useful in neuralgia in large doses, 30 grains, in conjunction with quinine.

The seeds are not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Helzakar, Kaklehkabar, Qaqilhahekibar—; *Bengal:* Bara elachi—; *Burma:* Ben, Pala—; *Canarese:* Doddayelaki—; *Deccan:* Bari yilayechi—; *English:* Greater Cardamom—; *Gujerati:* Elachi, Elcho, Moto ilachi—; *Hindi:* Bari ilachi—; *Malayalam:* Chandrabala, Perelam—; *Marathi:* Moteveldode—; *Persian:* Hailkallan, Qaqilahekahan, Qaqilahezakar—; *Sanskrit:* Aindri, Bahula, Bala, Balavati, Bhadraila, Brihadaela, Charmasambhava, Divyagandha, Ela, Garbhasambhava, Ghritachi, Goputa, Indrani, Kanta, Kanyakumari, Kayastha, Mahila, Maleya, Nishkuti, Prithvi, Sthulaila, Surabhitvaka, Tadaphala, Tridivodbhava, Triputa—; *Tamil:* Arugasani, Kattelam, Periyayelam, Perelam, Sandirigai—; *Telugu:* Peddayelaki—; *Urdu:* Ilayachikallan—; *Uriya:* Brihadupakunchika, Shulaila—.

3. **Amomum aromaticum** Roxb. Fl. Ind. I (1832) 45.—PLATE 943.

Stems in tufts from the rhizome, 60-90 cm. high. Spike globose 3.2-3.8 cm. with the peduncle subterranean (but somewhat elongating in fruit) with imbricating sheathing bracts. Floral bracts oblong, ribbed, mucronate. Flowers pale yellow. Ovary sericeous. Calyx 1.8-2 cm. long, villous, 3-toothed. Corolla-tube 2.5 cm. villous, petals nearly as long, sometimes white tinged with brown, sublanceolate, obtuse, dorsal somewhat cucullate. Lip twice as long as the petals, suborbicular with cuneate base. Anther-crest about 6 mm. diam. with 3 acute lobes. Fruit narrowly obovoid or ovate, size of a large nutmeg, 3.3 cm., somewhat rugose, 3-valved. Seeds several in each cell.

Distribution : Nepal, E. Himalaya, Khasia Hills, Sylhet, N. Bengal.

The therapeutical properties are the same as those of *A. subulatum.*

The seeds are used as a condiment by the Chinese and for a variety of disorders including dyspepsia and catarrh.

Bengal: Morangilachi—; *Cantonese:* Ts'ao Kuo—; *Chinese:* Ts'ao Kuo—; *Hindi:* Morangilachi—; *Malaya:* Chow Koh—; *Marathi:* Veldode—.

4. **Amomum costatum** Benth. in Gen. Pl. III, 644.

Rootstock 13 mm. diam. Leafy stem stout, 1.5-1.8 m. Leaves 60-90 by 7.5-10 cm., oblong-lanceolate, pubescent beneath. Spikes 5-7.5 cm., oblong, shortly peduncled; peduncle as long as the spike; outer bracts pink, 3.8 cm. long, oblong-lanceolate, glabrous. Corolla-tube 5 cm., cylindric; segments obtuse, half as long as the tube. Lip 5 cm., twice as long as the corolla-segments, deflexed, ligulate, red-yellow, tip entire, flat in the upper half, margins below the middle slightly incurved. Fruit 13 mm., ovoid, strongly ribbed, smooth. Seeds many, obovoid, truncate, acrid, aromatic, brownish.

Distribution : E. tropical Himalayas, Sylhet.

In Chinese medicine the seeds are employed for ailments of the stomach, and for asthma and pulmonary affections and general debility.

Chinese: Tou K'ou—.

ZINGIBER Adans.

Herbs with elongated leafy stems and horizontal tuberous rootstocks. Leaves oblong-lanceolate. Flowers in spikes usually radical, less commonly terminal, very rarely lateral on the leafy stems; peduncle short or long; bracts persistent, usually 1-flowered. Calyx cylindric, shortly 3-lobed. Corolla 3-lobed, with a cylindric tube; lobes lanceolate, the upper concave. Stamen 1 perfect; filament short; anther 2-celled, the cells contiguous, with a narrow crest as long as themselves; lateral staminodes 0, or adnate to the obovate-cuneate lip. Ovary 3-celled; ovules many, superposed; placentas axile; style filiform; stigma small, subglobose. Fruit an oblong capsule, tardily dehiscent. Seeds large, globose, arillate.—Species 55.—Indo-Malaya, New Guinea.

A. Leaves glabrous beneath
    1. Leaves lanceolate. Spike oblong, cylindric .... 1. *Z. officinale.*
    2. Leaves oblong-lanceolate. Spike oblong, very dense ..... 2. *Z. zerumbet.*
B. Leaves more or less pubescent beneath
    Leaves oblong-lanceolate, pubescent beneath .... 3. *Z. casumunar.*

Rhizome aromatic, stimulant, carminative, and sialagogue.

Z. mioga Rosc. is used medicinally in Japan and China; *Z. officinale* Rosc. in China, Cambodia, Brazil, Guiana, Guinea, the Gold Coast; *Z. zerumbet* Rosc. in Madagascar.

Several species enter into the composition of Malayan ipohs.

The rhizome of *Z. officinale* Roscoe is officinal in Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Japan, Norway, Russia, Sweden, Switzerland, United States of America.

1. **Zingiber officinale** Rosc. in Trans. Linn. Soc. VIII (1807) 348.—PLATE 944.

Rhizome stout tuberous with erect leafy stems 0.6-1.2 m. high. Leaves narrow, distichous, subsessile on the sheaths, linear-lanceolate, 1·2 cm. wide, glabrous. Flowers greenish with a small dark purple or purplish black lip, in radical spikes 3.8-7.5 cm. long and 2.5 cm. diam. on peduncles 15-30 cm. long. Stamen dark purple, as long as the lip, rather shorter than the corolla.

Distribution : Widely cultivated in tropical Asia.—Native country unknown

The rhizome is sweet, pungent, heating; appetiser; laxative, stomachic, aphrodisiac, carminative; useful in diseases of the heart and the throat, dyspepsia, inflammations, "kapha" and "vata", bronchitis, asthma, vomiting, pains; should not be used in leucoderma, anæmia, strangury, leprosy, ulcers, fevers, burning sensations, diseases of the blood.—Ginger is pungent; stomachic, aphrodisiac, laxative, alexiteric; improves taste; useful in indigestion, vomiting, pains, asthma, bronchitis, diseases of the heart, elephantiasis, piles, eructations, abdominal troubles, scorpion-sting, snake-bite (Ayurveda).

The rhizome has a sharp taste, pungent; stomachic, aphrodisiac, tonic, expectorant, carminative; removes pain due to cold, worms from the brain; gives lustre to the eye.—Ginger is anthelmintic; good in piles, rheumatism, headache, lumbago, pains (Yunani).

Among the Mundas of Chota Nagpur, the fresh root is ground and mixed either with honey or with clarified butter and held over a fire till pasty, when it is made into pills, which are used as a remedy against cough, the dose being about four a day.

The plant is used in Guiana and Guinea, as an aromatic, stomachic and stimulant.

In Cambodia, the rhizome is given internally as an aromatic tonic; externally it is applied to boils and enlarged glands.

In China and Malaya, ginger is largely used as a condiment and in domestic medicine. It is prescribed as an adjunct to many tonic and stimulating remedies. The root skin is used as a carminative and is said to be a remedy for opacity of the cornea.

In Perak, thin dry slices of the root are sold as a well-known vermifuge.

Dry ginger enters as an ingredient into several combinations in the Indian Pharmacopœia, Vaidyans attribute to this drug stimulant, digestive and carminative properties. At Payyanur, in Malabar, I was told that the juice expressed from fresh ginger in gradually increasing doses was a strong diuretic in cases of general dropsy, whatever the cause might be. In three cases of ascites with dropsy arising from cirrhosis of the liver of recent origin, there was, when the juice was administered, complete subsidence of ascites and disappearance of the dropsy. The fresh juice of the drug acted as a strong diuretic. The patients passed gradually increasing quantities of urine daily. It did not prove efficacious in dropsy of chronic Bright's disease and chronic heart disease; on the other hand, such cases became worse under its use. Long-standing cases of cirrhosis with ascites did not derive the slightest benefit from its administration (Koman).

Ginger is a well-known popular remedy for snake-bite and scorpion-sting; but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

The essential oil from the rhizomes was studied by Sanjivarao, Sudborough, and Watson (*Journ. Ind. Inst. Sc.;* VIII (A), 1925), and later by Moudgill (*Journ. Ind. Chem. Soc.;* V, 1928).

Arabic: Zanjabil—; *Assam:* Ada—; *Bengal:* Ada—; *Bombay:* Adu, Ale—; *Brazil:* Mangaratia, Zingiber—; *Burma:* Khyenseing—; *Canarese:* Alla, Ardraka, Hasisunthi, Sunti, Vanasunthi—; *Cantonese:* Kon Keung, Keung p'i—; *Catalan:* Gengibre—; *Chinese:* Chiang P'i, Kan Chiang, Kiang, Sheng Chiang—; *Danish:* Ingefaer—; *Deccan:* Ala—; *Dutch:* Gémber—; *English:* Ginger—; *Ewe:* Engkrama, Engkrawusa—; *Fanti:* Akakadur, Tsintsinmin—; *French:* Gingembre, Herbe au gingembre—; *Fulah:* Niamakubedi—; *Ga:* Engelfail, Kakaotchofang—; *German:* Ingwer—; *Hausa:* Chitta Afu—; *Hindi:* Ada, Adrak—; *Hungarian:* Gyoember—; *Ilocano:* Baseng—; *Italian:* Zenzero, Zenzevero—; *Konkani:* Alem—; *Krepi:* Engkrama—; *Krobo:* Odzahwi—; *Kyerepon:* Abrofoyisa, Nkrabodo—; *Malay:* Alea, Baring, Haliabara—; *Malaya:* Keong phee, Kon Keung—; *Malayalam:* Andrakam, Chinchatakam, Chinchiver, Chukku, Inji, Sringiveram, Tinkshnottham—; *Malinke:* Niemekou—; *Marathi:* Ale—; *Mundari:* Ade, Adi—; *North-West Provinces:* Ada—; *Norway:* Ingefaer—; *Persian:* Shangabir, Zanjabil—; *Portuguese:* Gengibre, Gengivre, Gimgibre—; *Punjab:* Ada, Adrak—;

Roumanian: Ghimber, Imbir—; *Russian:* Imbir—; *Sanskrit:* Aṇupama, Apakrishnaka, Ardraka, Ardrashaka, Chandrakhya, Gulmamula, Kandara, Katubhadra, Katukkata, Machhaka, Mahija, Mulaja, Rahuchhana, Saikateshtha, Sharnga, Shringahera, Sushakaka, Vara—; *Sinhalese:* Inguru—; *Soussou:* Sarahn diabila—; *Spanish:* Gengibre—; *Swedish:* Ingefaera—; *Tagalog:* Luya—; *Tamil:* Allam, Arttiragam, Attiradam, Inji, Kulumamulam, Kodataram, Maruppu, Sangai, Sigaram, Singaveram, Singiveram, Sukku, Sundi, Ubugallam, Verkkombu—; *Telugu:* Allamu, Ardrakamu, Mahaushadamu, Sonti, Sunthi, Sringaberamu—; *Tulu:* Sunthi—; *Twi:* Akekaduru, Kakaduru, Kekeduru—; *Urdu:* Adraka—; *Uriya:* Ardroko. Oda, Sunthi—; *Zambales:* Layal, Pangas—.

2. **Zingiber zerumbet** Rosc. ex Smith Exot. Bot. II (1805) 105, t. 112; Wight Ic. t. 2003.—PLATE 945.

Rootstock large, not much branched, hard, biennial, yellow inside, with a strong aromatic ginger-like taste, but with some bitterness; root fibres vermiform; leafing stem 0.9-1.5 m. high, about 13 mm. diam., cylindric, glabrous, annual. Leaves 20-30 by 5-7.5 cm., sessile, oblong-lanceolate or oblanceolate, acuminate, glabrous, base narrowed; ligule 1.3-2 cm. long, truncate, membranous. Flowering stem 30-45 cm. long, stout, usually flexuous, clothed with long appressed obtuse sheaths. Flowers pale sulphur-yellow, in conico-oblong or ovoid obtuse spikes 7.5-10 by 5 cm.; bracts 2.5-3.8 cm. long, closely imbricate, ovate-oblong or obovate, with rounded apex and pale membranous margins, bright green at first but becoming red in fruit. Calyx-tube 2.5 cm. long, appressed to the corolla-tube, 3-toothed, glabrous. Corolla-tube 3.2 cm. long; lobes ovate-lanceolate, acuminate, the lateral smaller, adnate to the base of the lip. Lip shorter than the corolla-lobes and of a darker yellow, 3-fid; lobes obtuse, the midlobe the longest. Anther glabrous. Style glabrous; stigma minute, funnel-shaped with ciliate mouth. Capsules ellipsoid, 2.5 cm. long. Seeds 4 mm. long, oblong, black.

Distribution: Throughout India, Ceylon, Malay Peninsula.—Widely cultivated in the tropics of the Old World.

The rhizome is used like the officinal ginger. It is employed as a hot remedy for coughs, asthma, "special diseases", worms, leprosy and other skin diseases.

In Madagascar, the boiled rhizome is given in pulmonary affections.

Bengal: Mahabaribach, Narkachur—; *Bicol:* Laya—; *Canarese:* Agalesunthi, Kallusunthi—; *French:* Gingembre sauvage—; *Hindi:* Mahabaribach, Narkachur—; *Hova:* Lakitra—; *Malay:* Lammpayang—; *Malayalam:* Kattinji, Kattinjikuva—; *Menabe:* Sakarivondambo—; *Punjab:* Kachur, Narkachur—; *Sanskrit:* Ahava, Avanti, Karpuraharidra, Kolanjana, Kumbhika, Sthulagranthi, Viranam—; *Sinhalese:* Waliguru—; *Tagalog:* Tamo—; *Telugu:* Karallamu, Karupasupu, Santapasupu—; *Tulu:* Kallusonti—; *Uriya:* Bonooda, Gondhosunthi—; *Visayan:* Dao, Lampuyang—.

3. **Zingiber cassumunar** Roxb. in As. Res. XI (1810) 347, t. 5.—Plate 946.

Rootstock perennial, yellow inside, with an aromatic, warm, somewhat camphoraceous taste, without bitterness. Leafing stem 1.2-1.8 m. high. Leaves subsessile, 23-35 by 2-3.2 cm., oblong-lanceolate, acute, glabrous above, pubescent beneath, base slightly rounded; sheaths pubescent. Flowers in dense fusiform or oblong-ellipsoid spikes 9-15 by 3.8-5 cm.; peduncles 10-25 cm. long, with numerous oblong sheaths; bracts 2.5-3.8 cm. long and nearly as broad as long, broadly ovate, subacute, bright red or greenish red, or green, pubescent and with narrow membranous margins. Calyx 2 cm. long, membranous, truncate, glabrous, split half way down. Corolla-tube 2.5 cm. long, slender, glabrous; lobes lanceolate, the lateral 2.5 cm. by 6 mm., the dorsal 3.2 by 1 cm., concave. Lip suborbicular, deeply 2-lobed, nearly 2.5 cm. diam., yellow (not spotted), with crisped margins. Stamen yellowish white, shorter than the lip, the appendex of the connective long, flexuous. Style glabrous; stigma obconic, ciliate. Capsules subglobose, 17 mm. long, membranous. Seeds many, very small, purple.

Distribution: Throughout India, Ceylon, Malay Peninsula.—Widely cultivated in tropical Asia.

It has a similar reputation to the officinal ginger, and in the Konkans is considerably used as carminative stimulant in diarrhœa and colic.

The rootstock is not an antidote to snake-venom (Mhaskar and Caius).

Bengal: Banada—; *Canarese:* Kadushunti—; *Hindi:* Banada—; *Malay:* Lammpayang—; *Marathi:* Nisan, Nisana, Penlekosht—; *Mundari:* Birade, Tonangade—; *Sanskrit:* Vanardraka—; *Telugu:* Karallamu, Karpushpu, Kurapasupu—; *Uriya:* Bonooda, Vanardraka—.

COSTUS Linn.

Herbs with long leafy stems; rootstock tuberous, horizontal. Leaves oblong, with broad sheaths. Flowers in dense globose or ovoid usually terminal heads. Calyx short, funnel-shaped; teeth 3, ovate. Corolla-tube short; corolla-lobes large, oblong, subequal. Stamen 1 perfect; filament forming with the connective an oblong petaloid process with the contiguous linear anther-cells situated in its middle; lateral staminodes minute or obsolete. Lip large, obovate, with incurved margins. Ovary 3-celled; ovules many, superposed; placentas axile; style filiform; stigma with a semilinear marginally ciliate foveola. Fruit a globose or ovoid capsule tardily opening on one side between the ribs. Seeds obovoid or subglobose; aril short.—Species 100.—Tropics.

The root is a bitter tonic; the herb a cooling febrifuge.

The following species are used medicinally in Indo China—*C. speciosus* Smith—; in Guiana—*C. arrabidae* Steud.—; in Brazil—*C. arrabidae* Steud., *C. spicatus* Sw., *C. spiralis* Roscoe—; in Guinea and the Gold Coast—*C. afer* Ker.—.

C. glabratus Sw. enters into the composition of Malayan ipohs.

1. **Costus speciosus** Sm. in Trans. Linn. Soc. I (1791) 249. —PLATE 947.

An erect plant 1.2-2.7 m. high; rootstock tuberous, insipid; stem subwoody at the base. Leaves 15-30 by 5.7-7.5 cm., subsessile, spirally arranged, oblong or oblanceolate-oblong, acute or acuminate, often cuspidate, glabrous above, silkv-pubescent beneath, base rounded; sheaths coriaceous; ligule 0. Flowers white, numerous, in very dense spikes 5-12.5 by 3.8-7.5 cm.; bracts 2-3.2 cm. long, ovate, acuminate, often pungently mucronate, bright red; bracteole solitary below the calyx, 16 mm. long. Calyx 3.2 cm. long; lobes 6 mm. long, deltoid-ovate, cuspidate. Corolla-tube as long as the calyx; lobes ovate-oblong, apiculate, the lateral lobes 3.5 by 1.3 cm., the dorsal 4 by 2 cm. Lip suborbicular, white with a yellow centre, 5 cm. and more in diam., concave, plicate, crisped, the margins sometimes meeting in the middle; disk pubescent and with a tuft of hairs at its base. Stamen 3.8-4.5 cm. long, with a tuft of hairs at the base of the filament; connective petaloid, 13 mm. broad, pubescent, produced into a glabrous appendage as long as the linear anther-cells. Style 3.8 cm. long, slender; stigma with a semilunar ciliate mouth. Capsules globosely 3-gonous, 2 cm. diam., red. Seeds black, with a white aril.

Distribution : More or less throughout India, Ceylon.—Malay Islands, China.

The root is pungent, bitter; useful in bronchitis, fever, "kapha" and "vata", dyspepsia, inflammations, anaemia, rheumatism, lumbago, hiccough (Ayurveda).

In the United Provinces, from the root a strengthening tonic is made, and it is also used as an anthelmintic.

In Bengal and in the Konkan, the root is considered depurative and aphrodisiac.

The root is prescribed by the Santals for pain in the marrow (Campbell).

The rootstock is not an antidote to snake-venom (Mhaskar and Caius).

Annam: Cu choc—; *Bengal:* Keu, Kust—; *Bombay:* Gudurichakanda, Kemuka—; *Burma:* Palangtoungwae—; *Canarese:* Changalakoshta, Chikke, Korikuttu, Niraja, Padmapatra, Pushkaramula—; *Gujerati:* Pokaramula—; *Hindi:* Keu, Kust—; *Malayalam:* Anakkuva, Anappu, Channa, Channakuva, Kottam, Marujanna, Narikkurampu, Patimukam, Pushkaramulam—; *Marathi:* Penva, Pinnga, Pushkarmula—; *North-West Provinces:* Keoli, Keyu—; *Sanskrit:* Bramhatirtha, Kashmira, Kushtha, Kushthabheda, Padmakarna, Padmapatra, Padmapatramula, Padmapunya, Padmavarnaka, Paushkara, Pushkarajata, Pushkaramula, Pushkarashifa, Sagara, Shulaghna, Shura, Shvasari, Subandhu, Vira, Virapushkaravhaya, Vriksharuha—; *Santal:* Orop—; *Sinhalese:* Tebu—; *Tamil:* Kottam, Kudavam, Kuravam, Kuttam, Kuttaiyidukki, Kugaimanjal, Malaivasambu, Ubariyavi, Vengottam—; *Telugu:* Chengalvakoshtu, Bommakachchika, Kashmiramu, Kimuka, Kushthamu, Paribhavayamu, Pushkaramulam—; *Uriya:* Chittorokudho, Ghauapohora, Kudho—.

ELETTARIA Maton.

Species 1.—Indo-Malaya.

E. cardamomum Maton is used medicinally in Cambodia.

The dried seeds of *E. Cardamomum* Maton var. *minuscula* Burkhill are officinal in Great Britain; *E. Cardamomum* Maton in Holland, Italy, and the United States of America; *E. Cardamomum* White & Maton in Austria, Denmark, Hungary, Japan, Norway, Russia, Sweden, and Switzerland; *E. Cardamomum* White & Maton (*Alpinia Cardamomum* Roxb.) in Portugal; *E. Cardamomum* (Roxburgh) Maton in Germany and Turkey.

1. **Elettaria cardamomum** Maton in Trans. Linn. Soc. X (1811) 254.—*Alpinia cardamomum* Roxb.; Corom. Pl. III (1819) 266.—PLATE 948.

Rootstock woody or fleshy, branching; stem 1.8-2.7 m. high; clothed below with spongy sheaths. Leaves subsessile, 30-60 by 7.5 cm., oblong-lanceolate. Panicles several to one leafy stem, 30-60 cm. long; bracts linear-oblong, persistent, 3.8-5 cm. long. Calyx 13 mm. long. Lip of corolla white, streaked with violet. Capsules subglobose or oblong, about 13 mm. long, marked with many fine vertical ribs.

Distribution: Malabar, on the W. Ghats, wild or cultivated, Ceylon cultivated.

The seeds are bitter, cooling, pungent, fragrant; cause biliousness; abortifacient, alexiteric; clear the head, the brain, the mouth; useful in asthma, bronchitis, piles, consumption, strangury, scabies, pruritus, diseases of the bladder, kidney, rectum, and throat (Ayurveda).

The seed is fragrant; tonic to the heart, stomachic, laxative, diuretic, carminative; causes thirst; lessens inflammation; useful in headache, earache, toothache, bad humours of the liver, the chest, and the throat (Yunani).

The seeds are used as an ingredient in compound preparations.

Both the root and the fruit are Cambodian medicines. The root is used for its laxative and tonic properties. The fruit is considered tonic, stimulant, stomachic, and emmenagogue; it is administered internally in diseases of the liver and the uterus; externally it is applied to tumours of the uterus.

Cardamoms are commonly given in snake-bite and scorpion-sting; but they are not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

The essential oil from the fruit was studied by Sanjivarao, Sudborough and Watson (*Journ. Ind. Inst. Sc.;* VIII (A), 1925).

Arabic: Hailbawa, Hel, Helbava, Khairbava, Kakilesigar, Qaqilah, Qaqilahesighar, Shoshmir—; *Bengal:* Elachi, Elaich, Gujeratiyelachi, Ilachi—; *Bombay:* Elchi, Ilachi, Malabariyelachi, Veldode—; *Burma:* Bala, Bhala, Pala, Panlat, Phala—; *Cambodia:* Krako—; *Canarese:* Elakki, Ilaji, Korangi—; *Ceylon:* Alakà, Cardamungu—; *Deccan:* Chhotiyilachi, Ilachi—; *English:* Lesser Cardamom, Malabar Cardamom—; *French:* Amome à grappes, Amome vrai, Cardamome de Malabar—; *German:* Kardamome—; *Greek:* Kardamomon—; *Gujerati:* Elchi—; *Hindi:* Chhotielachi, Chhotiilayetchi, Ilayechi—; *Khandesh:* Elechi—; *La Reunion:* Cardamome, Petit cardamome—; *Malayalam:* Bavula, Charmmasambhava, Ela, Elakkaya, Elam, Elattari, Kardvi, Putika, Tuti, Tuttha—; *Marathi:* Velloda—; *Persian:* Hail, Hil, Kakilahekhurd—; *Portuguese:* Cardamomo, Cardamomo menor—; *Punjab:* Illachi—; *Russian:* Kardamon—; *Sanskrit:* Bahula, Bhringaparnika, Chandrabala, Chandrasambhava, Chandrika, Chhardikaghhna, Chhardikaripu, Divodbhava, Dravidi, Ela, Gandhakuti, Gandhaphalika, Garbhara, Gaurangi, Kapotavarni, Korangi, Kshudraila, Kunati, Nishkuti, Prithhvika, Putika, Shoetaila, Sugandhi, Sukshmaila, Tikshnagandha, Triputa, Truti, Tuttha, Tvachisugandha, Upakunchika, Vayastha—; *Sinhalese:* Enasal, Ensal—; *Spanish:* Cardamomo—; *Tamil:* Anji, Elam, Korangi, Ilanji, Iravadi, Kalindam, Sukkumam, Sittelam, Taduvairi, Tiraladi, Tudi, Turutti, Vedi—; *Telugu:* Elaki, Korangi, Sannayelaki—; *Tulu:* Elaki—; *Urdu:* Ilayachikhurd—; *Uriya:* Ela, Olaicho—.

ALPINIA Linn.

Herbs with elongate leafy stems and horizontal rootstocks. Leaves oblong or lanceolate. Flowers in terminal racemes or panicles; bracteoles large, sometimes enveloping the buds. Calyx loosely tubular, 3-toothed. Corolla-tube cylindric, rarely longer than the calyx; corolla-lobes oblong or linear-oblong, the upper usually broader and more convex than the lateral. Stamen 1 perfect; filament flattened; anther-cells diverging at the top, occasionally with an orbicular crest; lateral staminodes minute or obsolete. Lip spreading, often orbicular, with incurved margins, sometimes with 2 subulate processes at the base of the claw. Ovary 3-celled; ovules few or many on each placenta; style filiform; stigma subglobose. Fruit globose, dry or fleshy, usually indehiscent. Seeds globose or angled.—Species 180. Warm Asia, Polynesia.

A. Anther not crested. Bud not enclosed in large bracteoles. Panicle terminal	
1. Panicle copiously compound	1. *A. galanga.*
2. Panicle narrow, copiously compound	2. *A. allhugas.*
3. Panicle short, slightly compound	3. *A. calcarata.*
B. Anther not crested. But enclosed in large membranous bracteoles. Raceme or panicle terminal	
1. Raceme simple. Bracteoles white	4. *A. malaccensis.*
2. Panicle cernuous, slightly compound. Bracteoles white, tipped with pink	5. *A. speciosa.*

The root is aromatic, stimulant, stomachic, resolvent, carminative, and vulnerary.

The following species are used medicinally in China—*A. galanga* Willd., *A. globosa* Horan, *A. kumatahe* Mak., *A. officinarum* Hance—; in Indo China—*A. galanga* Willd., *A. officinarum* Hance—; in Malaya—*A. officinarum* Hance—; in Brazil—*A. aromatica* Jacq.,

A. galanga Willd. and *A. malaccensis* Roscoe enter into the composition of Malayan ipohs.

The rhizome of *A. officinarum* Hance is officinal in Denmark, France, Germany, Holland, Norway, Russia, Sweden, Switzerland.

1. **Alpinia galanga** Swartz Obs. Bot. (1791) 8.—*A. Rheedii* Wight Ic. (1853) 2026.—PLATE 949.

Rootstock perennial, tuberous, slightly aromatic. Leaves 23-45 by 3.8-11.5 cm., oblong-lanceolate, acute, glabrous, green above, paler beneath, with slightly callous white margins; sheaths long, glabrous ligule reaching 10 mm. long, but usually shorter, rounded. Flowers greenish white, in dense-flowered panicles 15-30 cm. long; branches short; rhachis pubescent; pedicels 3-4 mm. long, bracts 10 mm. long ovate-lanceolate. Calyx 10 mm. long, tubular, irregularly 3-toothed. Corolla 3-2 cm. long; tube 13 mm. long; lobes oblong, obtuse, subequal, 6 mm. broad. Lip 2.2 cm. long; claw green, 6 by 2.5 mm.; blade white striated with red rather more than 13 mm. long, broadly elliptic, shortly 2-lobed at the apex, with a pair of subulate glands at the base of the claw. Stamen 2 cm. long. Fruit the size of a small cherry, orange-red.

Distribution: Throughout India, often cultivated, Ceylon.—Malay Islands.

The rhizome is pungent, bitter, heating, stomachic; improves appetite, taste, and voice; useful in " vata ", bronchitis, and diseases of the heart (Ayurveda).

The rhizome has a sharp odour and fairly good taste; stomachic, aphrodisiac, tonic, diuretic, expectorant, carminative; useful in headache, lumbago, rheumatic pains, sore throat, sour eructations, stuttering, pain in the chest, diabetes, burning of the liver, tubercular glands, diseases of the kidney (Yunani).

Hakims use the rhizome in impotence, bronchitis, and dyspepsia. It is disinfectant, used to distroy bad smells in the mouth or any other part of the body. It is also advocated in diabetes mellitus.

The rhizomes of this species are aromatic, pungent, and bitter, and are used in the form of an infusion in fever, rheumatism, and catarrhal affections. As a drug, they are supposed to improve the voice. The aromatic tubers are sometimes used as carminative or fragrant adjunct in complex prescriptions, but they have nothing peculiar in their properties or action.

The rhizome is hot and stimulating; used in *mesalihs*, has a sweet scent; is put into bazar spirits to make it more intoxicating. This habit of flavouring spirits with galangal also prevails in Russia. The seeds possess similar medicinal properties.

In Mysore, the rhizome is a domestic medicine, much used by old people with bronchial catarrh.

Cambodian mothers chew the corms and apply them to the head and body of children suffering from convulsions. The rhizome is also used internally in food poisoning.

In China, the seeds are considered calefacient, alterative, stomachic, sternutatory, beneficial in colic, diarrhoea, and vomiting.

Hakims ascribe to this drug tonic, stomachic, carminative, stimulant, and aphrodisiac properties. It is generally prescribed by vaidyans in combination with liquorice, long pepper and tail-pepper in cases of bronchitis and as a stomachic tonic. A decoction of this drug was tried in several cases of bronchial catarrh with beneficial effect (Koman).

Arabic: Khowlanjan, Khulanjan, Khulanjanekabir, Khulanjaneqasbi—; *Bengal:* Barakalijan, Barakulanjan, Kulanjan, Kulinjan—; *Bombay:* Baripankijar, Malabaripankijar—; *Burma:* Padagoji—; *Cambodia:* Kom deng, Pras, Pras sva—; *Canarese:* Doddadumprashme, Dumbarasme, Dumrashta, Rasmi, Sugandhavachi—; *Deccan:* Barakhulanjan, Baripankijar, Sufedpankijor—; *English:* Greater Galangal, Java Galangal—; *Gujerati:* Kolinjan—; *Hindi:* Barakalijan, Barakulanjan, Kulanjan, Kulinjan—; *Malay:* Launchar—; *Malayalam:* Aratta, Perasatta—; *Marathi:* Koshtkulinjan—; *Pampangan:* Lancoas—; *Persian:* Khurduwara, Khusraveduruekalan—; *Portuguese:* Galanga—; *Sanskrit:* Aruna, Dhumala, Elaparni, Gandhamula, Gandhavaruni, Kapidruma, Koraja, Kulanja, Kulanjana, Mahabharavacha, Nakuli, Patala, Purusha, Raktarenu, Raktapushpa, Rasna, Sugandha, Sugandhavacha, Sugandhayoga, Tikshnamula—; *Sind:* Kathi, Kunjar—; *Tamil:* Anandam, Arattai, Ardubam, Attumam, Kandanaguliyam, Ormarundu, Perarattai, Sattiradji, Sugandam, Tittiram, Tumbarattagam—; *Telugu:*

Dumparashtrakamu, Kachoramu, Peddadumparashtrakamu—; *Urdu:* Kulanjan—; *Visayan:* Langcauas—.

2. **Alpinia allhugas** Rosc. in Trans. Linn. Soc. VIII (1807) 346.—PLATE 950.

A stout perennial herb 0.9-1.8 m. high; root tuberous, aromatic. Leaves 20-45 by 4.5-10 cm., sessile or nearly so, linear-oblong or oblong-lanceolate, acuminate, cuspidate, glabrous, base acute; sheaths long, glabrous, striate, compressed; ligule nearly 6 mm. long, obtuse, glabrous. Flowers inodourous, pink, in erect, decompound, lax- or dense- flowered panicles 15-30 cm. long, the branches short, ascending, with large narrowly linear deciduous floral leaves sometimes reaching 23 cm. long, at the lower forks; rhachis pubescent or tomentose; pedicels short; bracts small, ovate, cupular. Calyx subcampanulate, 10-13 mm. long, pubescent, the mouth oblique, obtusely 2-3-toothed. Corolla-tube about as long as the calyx; lobes longer than the tube, linear-oblong, cymbiform, dorsally pubescent, shortly spurred below the hooded tip. Lip rather more than 2.5 cm. long (including the slender claw), pink, obovate-cuneate or suborbicular, 2-fid, the margins waved and erose; claw as long as the limb, with 2 linear-subulate glands 2.5 mm. long at the base. Stamen arcuate, shorter than the lip; connective not or obscurely crested. Style glabrous; stigma small. Fruit black, thin, globose, 17 mm. diam., irregularly rupturing. Seeds many, small, black, angular.

Distribution : S. Konkan.

The properties and uses are the same as those of *A. galanga.*

Bengal: Taro, Taruko—; *Malayalam:* Malayinjikkuva—; *Sanskrit:* Taraka—; *Sinhalese:* Alan, Alu, Alugas, Keleniya—; *Uriya:* Toroka—.

3. **Alpinia calcarata** Rosc. in Trans. Linn. Soc. VIII (1807) 347; Wight Ic. t. 2028.—PLATE 951.

Rootstock perennial, not tuberous. Leafing stem slender, 0.6-1.2 m. high. Leaves 15-30 by 2.5-5 cm., lanceolate, acuminate, green and glossy. Flowers numerous, large, in dense panicles 7.5-10 cm. long; rhachis pubescent; bracts small, ovate. Calyx-tube funnel-shaped, 6-8 mm. long. Corolla-segments 13 mm. long. Lip

2.5-3.8 cm. long, ovate-oblong, sessile, yellow, streaked with purple veins, emarginate. Ovary densely pubescent; ovules many in each cell. Capsules globose, red.

Distribution : Cultivated in the Konkan and in Ceylon.—China, and widely cultivated.

The therapeutic properties and uses are the same as those of *A. galanga.*

Uriya: Toroni—.

4. **Alpinia malaccensis** Rosc. in Trans. Linn. Soc. VIII, 345; Bot. Reg. t. 328.

Rootstock perennial. Leafy stem 1.8-3 m. Leaves 60-90 cm., oblong-lanceolate, pubescent beneath. Raceme erect, 15-30 cm., rhachis very stout, densely pubescent; pedicels all very short. Buds oblong, obtuse; bracteoles oblong-navicular, 2.5 cm. Corolla-segments white, oblong, 2.5 cm. Lip ovate, emarginate, 3.8-5 cm., margin pale; centre beautifully variegated red and yellow; edges much incurved. Capsule globose, yellow, 2.5 cm. diam. Seeds many, ovoid.

Distribution : E. Himalaya Assam, Khasia Hills and Chittagong up to 5,000 ft., Malabar.

The plant enters into the composition of Malayan " ipoha ".

Malay: Bangle—; *Tamil:* Saliyeridumpa—.

5. **Alpinia speciosa** K. Schum. Fl. Kaiser-Wilhelm's L. (1887),—*Zerumbet speciosum* Wendl. Cert. Ann. I, fasc. 4 (1798) 19.—*Alpinia nutans* Roscoe in Smith Exot. Bot. II (1805) 93, t. 106.

Rootstock perennial. Leafy stem 2.4-3 m. Leaves 30-60 by 7.5-15 cm., oblong-lanceolate, finely pubescent beneath. Panicle 15-30 cm.; rhachis very hairy; lower branches bearing 2-3 crowded flowers. Bracteoles 2.5 cm. or more, broad, oblong-navicular. Corolla-segments oblong, 2.5 cm., white tipped with pink. Lip ovate, 3.8 cm. long and broad, base spurred, margins pale, centre beautifully variegated with red and yellow, margins much incurved. Capsule red, globose. Seeds many in a cell.

Distribution : Cochin-China, China, Japan. Cultivated in many places in India.

The rhizome is often used as a substitute for *A. galanga*, and even as a substitute for ginger.

Bengal: Punagchampa—; *Burma:* Pagagyis—; *Canarese:* Dumbarashtaka—; *La Reunion:* Longose—; *Persian:* Kastazerambet—; *Tamil:* Sittarattai—.

MARANTA Linn.

Herbs with usually branched stem. Leaves often very ornamental in colouring. Flowers pedicelled, paired on a common pedicel, 2-4 pairs enclosed in each bract of a spike of opposite distichous bracts terminating the stem or its branches, proper pedicels of each flower unequal. Spikes sometimes panicled. Corolla-tube longer than the calyx. Two lateral staminodes petaloid, larger than the others. Cucullate staminode usually with broad curved ear. Fertile stamen with a free appendage. Ovary 1-celled, 1-ovuled.—Species 30.- Tropical America.

Rhizome nutrient and demulcent.

The starch in the rhizome of *M. arundinacea* Linn. is officinal in Denmark, Holland and Portugal.

1. **Maranta arundinacea** Linn. Sp. Pl. (1753) 2.

A branched herb 0.9-1.8 m. high with creeping rootstock and fleshy cylindrical-obovoid tubers about the size of carrots, covered with pale scales which leave scars when they fall. Leaves ovate-oblong and up to 25 by 11.3 cm. at base of stem, upper 10-15 cm. ovate-lanceolate to narrowly lanceolate with rounded or cuneate base. Inflorescence laxly 2-chotomously branched with ultimate branches 2-flowered. Flowers white, 18-25 mm. long, sepals 13 mm.

Distribution: Native of tropical America. Cultivated in grass green-houses and verandahs in India.

The rhizome is acrid and rubefacient, and is used as a vulnerary. It yields an arrowroot of excellent quality.

English: Arrowroot Plant, West Indian Arrowroot—; *French:* Maranta à feuilles de balisier—; *Hova:* Vilonala—; *Tamil:* Aruruttukkilangu—; *Telugu:* Palagunda—.

CANNA Linn.

Perennial rhizomatous herbs with large penninerved leaves and usually brilliantly coloured asymmetric flowers in spikes or panicled cymes. Calyx of 3 free sepals. Corolla with 3 perianth segments connate at base. Androecium consisting of a variable number of members, 1-5, partly adnate to the corolla-tube. One of these is fertile bearing a single marginal anther-cell, the rest of the stamen being petaloid. Opposed to the fertile stamen is a recurved petaloid staminode (labellum); the outer 2-3 petaloid staminodes (lateral staminodes) are usually erect. Style adnate at the base to the staminal tube, then broad and flattened, somewhat curved; stigma small, terminal and oblique. Ovary 3-celled with 2 rows of anatropous ovules in each cell. Fruit capsular, 3-celled, papillose, tubercled or echinate. Seeds several, globose. Embryo straight, surrounded by perisperm.—Species 60.—Tropical and subtropical America.

The rhizome is diuretic and diaphoretic.

The following species are used medicinally in Brazil—*C. edulis* Ker., *C. glauca* Linn., *C. lutea* Mill., *C. stolonifera* Bonche—; in the West Indies—*C. coccinea* Ait.—; in Cambodia, Guiana, and the Gold Coast—*C. indica* Linn.—.

1. **Canna indica** Linn. Sp. Pl. (1753) 1.—PLATE 952A.

Stem 0.9-1.2 m. Leaves 15-45 by 10-20 cm., lanceolate to ovate, oval, or almost orbicular, caudate-acuminate, veins arching, sheath open above, margins membranous; raceme with the pedicel 30 cm. or more, erect, pedicel with a long narrow sheath about the middle. Flowers rather distant, 5-6.3 cm. long; bracts 1.3-2.5 cm., oblong, membranous, obtuse, green; calyx-segment 6-8 mm., membranous, obtuse; corolla-segments 2.5 cm., erect, narrow, oblanceolate, acuminate, greenish or coloured; staminal segments longer than the corolla, 3 suberect, spathulate, 1 linear, revolute. Fruit erect, 1.3-2.5 cm. long, subglobose or oblong, obscurely 3-lobed, crowned with the calyx-segments, pericarp echinulate, black, thin. Seeds very many, globose, testa crustaceous, black, shining.

Distribution: Widely cultivated in India.

The root is given as a demulcent and stimulant. It is used as a diaphoretic and diuretic in fevers and dropsy.

When cattle have eaten any poisonous grass, which is generally discovered by the swelling of the abdomen, the natives administer to them the stock of this plant, which they break up into small pieces, boil in rice-water with pepper, and give the cattle to drink (Drury).

The seed is cordial and vulnerary (Baden Powell).

In Guiana, the roots are considered diuretic. The rhizome is made into emollient poultice and its decoction is given as a sudorific and diuretic.

The Ashantis mash the leaves in water and put them in their baths to cure fever.

In the Gold Coast, the flowers are said to cure eye disease.

In Cambodia, the roots are used as a depurant in yaws.

Adangme: Blaifotobi—; *Ashanti:* Aburobia, Ahabia—; *Bengal:* Kamakshi, Lalsarbojaya, Sarbajaya—; *Betsileo:* Tsipikopiko—; *Betsimisaraka:* Dingiza—; *Burma:* Buddatharana—; *Cambodia:* Chek tes—; *Canarese:* Hudingana, Kalahu—; *Deccan:* Ukilbarkimunker—; *Dutch:* Bloemriet, Indiaansch riet—; *English:* Indian Bead, Indian Reed, Indian Shot—; *Ewe:* Toviaku—; *French:* Balisier, Balisier des Indes, Petit balisier, Canne Congo, Canne d' Inde, Gingembre bâtard, Faux sucrièr de montagne—; *French Guiana:* Balisier—; *Ga:* Ahabia—; *German:* Bluemenrohr—; *Gujerati:* Akalabera—; *Hindi:* Sabbajaya, Sarvajjya—; *Hova:* Gingiza, Kingiza, Varandenda—; *Italian:* Canna d' India—; *Krobo:* Blaifotobi—; *La Reunion:* Safran marron—; *Madagascar:* Ambaradeda, Saonjovato, Varandeda—; *Malayalam:* Kattuvala—; *Marathi:* Devakeli—; *Mundari:* Kadalmuliba—; *North-West Provinces:* Kiwara—; *Philippines:* Tucastucas—; *Punjab:* Hakik—; *Russian:* Kanna—; *Sanskrit:* Devakili, Kamakshi, Krishnatamara, Sarvajaya, Shilarambha, Vanakadali—; *Sinhalese:* Butsarana—; *Spanish:* Canacoro, Cana de cuentas, Cana de las Indias, Yerba del rosario—; *Tagalog:* Cacuertasan, Cuintascuintasan, Ticas, Ticasticas, Tiquistiquis—; *Tamil:* Kalvalai, Kalvalaimani, Kundimani, Puvalai, Siramalai—; *Telugu:* Guruginja, Krishnatamara—; *Twi:* Aburobia—; *Uriya:* Sorobojoya—; *Visayan:* Balunsaying, Colintasan, Saguingsaguing, Tapuranga—.

MUSA Linn.

Tree-like herbs with thick stems composed of convolute leaf-sheaths. Leaves very large, oblong. Flowers in subterminal stout spikes, the lower female, the upper male; bracts large, spathaceous, ovate or orbicular. Calyx tubular, spathaceous, slit down one side to the base, 3-5-lobed. Corolla a single convex membranous petal as long as the calyx and opposite its slit, embracing the base of the stamens and style. Stamens 5 perfect (6th rudimentary or 0); filaments erect, stout, filiform; anthers linear, erect, 2-celled. Ovary 3-celled; ovules many, superposed; style filiform from a thickened base; stigma subglobose, 6-lobed. Fruit large, oblong or fusiform, obtusely 3-5-angled, fleshy, indehiscent. Seeds embedded in pulp, subglobose or angled by pressure; in cultivated forms often obsolete. —Species 30.—Palæotropics.

1. Seeds angled by pressure .... 1. *M. sapientum.*
2. Seeds very small and scarcely at all angled .... 2. *M. textilis.*

Various species are used medicinally in Madagascar and Guinea; *M. sapientum* Linn. is used in China and Cambodia; *M. ensete* Gmel., *M. sapientum* Linn., *M. textilis* Nees in Annam.

1. **Musa sapientum** O. Kuntze Rev. Gen. II, 692.—PLATE 952B.

Pseudostem 2.4-4.5 m. with oblong leaves 1.2-1.8 m. long. Spike soon decurved and finally drooping, 90 cm. or more long with very large ovate deep red or dull purplish, more or less pruinose bracts, lower 15-20 cm. long and deciduous, upper often forming a club. Lower bracts with numerous 2-seriate female or hermaphrodite greenish or yellowish flowers about 3.8 cm. long, above these the bracts contain male flowers only or the terminal ones are empty. Connate part of perianth 5-toothed free petal about half as long. Fruit oblong, 3-gonous in the wild form, about 7.5 cm. long with very astringent scanty flesh and numerous black or brownish black rugose seeds.

Distribution: Indigenous in Bihar and the E. Himalaya up to 4,000 ft., Ceylon.—Cultivated throughout India and the tropics.

The root is acrid; anthelmintic, tonic; increases appetite; useful in "kapha" and biliousness, pain in the ear, menstrual disorders, diseases of the blood, diabetes insipidus, acid dyspepsia, leprosy.—The juice of the stem is cooling, astringent to the bowels, antidysenteric; useful in thirst, strangury, urinary discharges, leprosy, diseases of the ear, the blood, the uterus, the vagina.—The flowers are sweet, acrid, oleagenous, cooling; anthelmintic, astringent to the bowels; useful in "vata", biliousness, consumption, bronchitis.—The unripe fruit is acrid, cooling, tonic, astringent to the bowels; causes "vata" and "kapha".—The ripe fruit is sweet, acrid, cooling, tonic, aphrodisiac; excites appetite; useful in leprosy, thirst, bronchitis, consumption, burning sensations, vaginal and urinary discharges, urinary concretions, biliousness; improves the complexion (Ayurveda).

The leaves are good for scabies and inflammations.—The juice of the root is anthelmintic.—The burnt stem is vulnerary.—The fruit has a sweet, good taste; indigestible; causes bronchitis; thickens the blood; tonic, astringent to the bowels, aphrodisiac; good for dry bronchitis, sore throat, kidney troubles (Yunani).

The root and stem are considered tonic, antiscorbutic, and useful in disorders of the blood and venereal disease. The root is also used as an anthelmintic.

The juice of the tender roots is used with mucilage for checking haemorrhages from the genital and air passages. Mixed with ghi and sugar it is given for gonorrhoea.

The juice of the bark and leaf is frequently given to children suffering from an overdose of opium. The juice of the bark mixed with ghi acts as a brisk purgative.

The sap forms a valuable drink and mouth-wash to allay thirst in cholera. It has been recommended in bites or stings from poisonous animals.

Young plantain leaves are used as a cool dressing for blisters, burns, &c., and to retain the moisture of water dressings. They may also be used as a green shade in ophthalmia and other eye diseases.

The unripe fruit in combination with other drugs is much used in diabetes (B. D. Basu).

The ripe fruit is an antiscorbutic and is very much used as a mild, demulcent, astringent diet in cases of dysentery.

The ashes produced by burning the dried leaves, the stem, or the entire plant are antiscorbutic; they are used in acidity, heart-burn, colic, and intestinal worms.

The juice of the flowers mixed with curds is used in dysentery and menorrhagia.

The gum obtained from the unripe plantain mixed with rice water is used in diarrhœa. In the Punjab, the sap of the fresh stem is largely used in nervous affections, *viz.*, hysteria, epilepsy, etc., (B. D. Basu).

Among the Mundas of Chota Nagpur the sap of the stem, in a dose of half a quarter to half a pint, is drunk in dysentry and diarrhœa. The root ground with molasses and mixed with water is drunk when the urine is white.

The sap of the young plant is a Cambodian remedy for diarrhœa and dysentery.

In Madagascar, the plant is credited with astringent, antiseptic, hydragogue, and diuretic properties. A decoction of the flowers and the leaves, and the pounded stem, are applied topically to burns and ulcers; they are used in dysentery, diabetes, ascites, dropsy.

The root and stem are not antidotes to snake-venom (Mhaskar and Caius).

Annam: Chuoi, Chuoi mat, Chuoi tieu—; *Arabic:* Mouz, Shajratulmouz, Shajratultahl, Tuhltula—; *Awuna:* Abladzo, Abladzongkaitia, Abladzoakpandu, Kordu—; *Bengal:* Kachkula, Kala, Keli—; *Betsileo:* Katakata, Otsy—; *Bombay:* Kel, Kela—; *Brazil:* Banana, Bananeira da terra, Bananeira de Sao Thome, Pacoaire, Pacobeira, Pacobussu, Pacoeira—; *Burma:* Hugapyau, Napiyasi, Ngapyishthi, Ngetpyau, Yakhaing, Yathilan—; *Cagayan:* Afapuyan, Afuyan—; *Cambodia:* Check, Chek chvea, Chek pheh—; *Canarese:* Bale, Budibale, Chandrabale, Elebale, Elakkibale, Havubale, Hombale, Jenubale, Gulurbale, Kadali, Kandu, Kattubale, Madarangabale, Mavuju, Pachchabale, Puttabale, Rajabale, Rambha, Rasabale—; *Ceylon:* Kehelhaba—; *Chinese:* Kan chiao, Pa Ko—; *Congo:* Quihuaaquitiba—; *Deccan:* Kel, Maoz, Mouz—; *Dutch:* Bananenboom, Paradijs vijgenboom—; *Egypt:* Manz—; *English:* Adam's Fig, Banana, Fig of India, Plantain—; *Ethiopia:* Muinga—; *Ewe:* Abladzo, Kordu—; *Fanti:* Brordeapentu, Brordebesse, Brordengretia, Mpua—; *French:* Bananier, Figuier d'Adam, Figuier des Indes, Plantain des Indes, Plantain en arbre, Plantainier—; *Ga:* Akwadu, Amada—; *German:* Bananenbaum, Paradiesfeigenbaum—; *Greek:* Phyximilon, Syki Adam—; *Guinea:* Dananas—; *Gujerati:* Kela—; *Hasada:* Kadal, Saeobkadal—; *Hausa:* Ayaba—; *Hebrew:* Dudain—; *Hindi:* Amrit, Kachkula, Kela, Maozkula—; *Ilocano:* Alimuguen, Balayang, Bunnec, Butneg, Butneng, Saba—; *Iloilo:* Moco—; *Italian:* Albero dei banani, Fico d' Adamo, Musa—; *Japanese:* Baso—; *Java:* Pisang, Pisangmadja—; *Konkani:* Kel—; *Krepi:* Abladzo, Abladzoakpandu, Abladzoampena, Abladzongkaitia, Kordu—; *Krobo:* Kodu, Mangdanga, Mangnanga—; *Madagascar:* Akondro—; *Malabar:* Bala—; *Malayalam:* Ettakkaya, Ettavala, Kadalam, Karinkadali, Kashthhila, Kunnan, Pichchha, Vannan, Vala—; *Marathi:* Kadali, Kel—; *Mundari:* Ambrit, Ambritkera, Amrit, Amritkera—; *Naguri:* Amritkera, Kera—; *Persian:* Mouz, Tuhltula—; *Philippines:* Anonoo, Anuang, Batavia, Dalividalaga, Dinuguan, Lantundal, Machin, Platano, Sabangvisaya—; *Portuguese:* Bananeira, Figos da India, Pacoeira—; *Roumanian:* Banan—; *Russian:* Banan, Raiskaya smokovnitza—; *Sakalavo:* Ontsy—; *Sanskrit:* Alabu, Ambusara, Amsumatphala, Balakapriya, Bhanuphala, Charmannvati, Dirghhapatra, Guchhandatika, Guchhaphala, Hastivishani, Kadali, Kashthhila, Mocha, Nagaranshadhi, Nisara, Rajeshta, Rambha, Rodraka, Sakritphala, Sukumara, Suphala, Tantuvigraha, Tatpatri, Urustambhha, Vanabhhusha, Vanalakshmi, Varanabusa, Varanavallabha, Varavriksha—; *Sind:* Kewiro—; *Sinhalese:* Kehal, Kehel, Walkaihil—; *Spanish:* Banano, Higuera de Adan, Higuera de las Indias, Platano de America, Platano cambari de Mejico, Platano guineo, Platano mayor—; *Tagalog:* Anuang, Baloy, Benticohol, Bringticohol, Biso, Botoan, Botohan, Bungulan, Butuan, Dinuguan, Gorjoran, Lacatan, Matavia, Quinanayan, Saging, Saguing, Tampuhing, Tinalong—; *Tamil:* Ambanam, Angusam, Arambai, Arayakkommai, Arbaruttam, Aresigam, Asogam, Irasandalai, Kavar, Kavargali, Kadali, Mandan, Mamaraivalai, Namavalai, Pachilandai, Puvalai, Paivalai, Pidagadali, Puvanvalai, Sami, Segili, Sevvalai, Sugandam, Turaivalai, Udiranvalai, Valai—; *Telugu:* Amritapany, Ananti, Anati, Anti, Arati, Batisa, Bontarati, Chakrakeli, Desavalachakrakeli, Ettachakrakeli, Ettarati, Kadalamu, Kadali, Karpurachakrakeli, Kommanati, Kommarati, Nallarati, Natabam, Pachcharati, Rambhha, Sugandhhalu, Tatachchhadamu, Teneyarati—; *Twi:* Brordeapim, Kwadu, Mpantuosqboaso, Orbororde—; *Urdu:* Kela—; *Uriya:* Bontolokodoli, Kodoli, Konokorombhha, Rombhha, Ramokodoli—; *Visayan:* Ampal, Aricundai, Aricundal, E langun, Baloy, Binalaton, Binato, Caracton, Carnate, Moco, Saging, Tarnate—.

2. **Musa textilis** Née in Cav. Ann. Scienc. Nat. IV, 123.

Leaves firmer in texture than in *sapientum*, yielding a useful fibre, bracts polished. Seeds very small scarcely at all angled.

Distribution: Native of the Philippines.—Cultivated in India.

The root is used as a worm remedy in Annam.

Annam: Ba tieu, Chuoi rung—; *English:* Manilla Hemp—; *Hova:* Sarika—; *Tamil:* Peyanvalai—.

HAEMODORACEAE.

Perennial herbs; rootstock short, tuberous, with usually fascicled root-fibres. Leaves usually radical, often distichous, narrow, with equitant sheaths; nerves parallel. Flowers hermaphrodite, regular or nearly so, in terminal spikes, racemes or panicles. Perianth corolline, 2-seriate; lobes 6, imbricate or induplicate-valvate. Stamens 6, opposite or more or less adnate to the perianth-lobes, or fewer; anthers erect or versatile, 2-celled, rarely opening by pores. Ovary inferior or subinferior perfectly or imperfectly 3-celled; ovules 1 or more, attached to the inner angle of the cells; style filiform (rarely short or obsolete); stigma simple or 3-notched.

Fruit a superior or nearly superior loculicidal capsule, or inferior indehiscent berry tipped by the perianth. Seeds various; embryo small, partially enclosed in fleshy albumen.—Australia, S. Africa, America, Central and E. Asia.

The order exhibits calmant and vulnerary properties.

SANSEVIERIA Thunb.

Stout herbs with a short often stoloniferous rootstock. Leaves narrow, cartilaginous or fleshy, flat or terete, nerves immersed. Scape stout; flowers racemose. Perianth-tube long, slender, lobes narrow. Stamens 6, on the leaves of the lobes; filaments filiform; anthers dorsifixed. Ovary superior, attached by a broad base, 3-celled; style filiform, stigma simple; ovules solitary, erect in each cell. Fruit membranous, indehiscent. Seeds 1-3 ripening outside the pericarp globose, all large, or 1-2 imperfect; testa long, fleshy or succulent.—Species 30.—Tropical Africa and Asia.

Various species are used medicinally in the Gold Coast, *S. guineense* Willd. is used in Guinea.

1. **Sansevieria roxburghiana** Schult. Syst. Veg. VII, 357, f. 12 D. E.—PLATE 953

Stemless, with a creeping rootstock. Leaves 6-24 to a growth, not 2-ranked, those of juvenile plants and sometimes the outer of the tuft spreading, smooth above, slightly rough beneath, 10-20 cm. long, 2.5-3.8 cm. broad, flat, strap-shaped or narrowly lanceolate, usually abruptly rounded into a stout subulate point 0.6-2.5 cm. long; inner or adult leaves ascending and slightly recurving, somewhat stiff, mostly more than 30 cm., but varying from 20-60 cm. long, 1.3-2.5 cm. broad, 3-4 mm. thick, linear, deeply concave-channelled down the face, rounded or very obtusely keeled on the back, gradually tapering into a stout subulate soft green point 0.6-5 cm. long, green, transversely marked with darker green rather regular bars on both sides and with 6-11 longitudinal dark green lines on the scarcely paler under-surface and often 1-3 on the upper; edges green, with age becoming very narrowly whitish. Flower-stem 30-75 m. high, with 4-5 erect acuminate sheaths 2.5-3.8 cm. long on the lower part and a spike-like raceme 30-45 cm. long of flower-clusters above; bracts 3-4 mm. long, lanceolate-attenuate, membranous. Flowers about 4 in a cluster; pedicels 5-8.4 mm. long; jointed near the middle, with the persistent part 3-4 mm. long; tube 6.3-7.3 mm. long; lobes 8.4-9.5 mm. long, linear, obtuse.

Distribution: Coromandel coast.

This fleshy creeping root is, in a slight degree, warm to the taste, and of a not unpleasant odour. It is prescribed, in the form of an electuary, in consumptive complaints and coughs of long standing, to the quantity of a small tea-spoonful twice daily. The juice of the tender shoots of the plants is administered to children to clear their throats of viscid phlegm.

The root and leaves are useless in the symptomatic treatment of snake-bite (Mhaskar and Caius).

Bengal: Gorachakra, Murahara, Murba, Murga, Murgabi, Murgli—; *Bombay:* Ghannasaphan, Morwa, Murgali—; *Canarese:* Maruga—; *Deccan:* Murgali—; *English:* Bow-string Hemp—; *Hindi:* Marul, Murva—; *Marathi:* Ghannasaphan, Nagphan—; *Mundari:* Huringkongga—; *Salem:* Mailai, Mangi—; *Sanskrit:* Marura, Muruva—; *Sinhalese:* Niyanda—; *Tamil:* Marul—; *Telugu:* Chaga, Chamacada, Saga—.

IRIDACEAE.

Perennial herbs; rootstock various. Leaves narrow, often distichous and equitant. Flowers 2-bracteate. Perianth superior, petaloid, segments 6-biseriate, imbricating. Stamens 3, epigynous, or adnate to the outer perianth-segments; anthers often narrow, extrorse. Ovary 3-celled; style simple; stigmas 3, simple or petaloid or variously cleft; ovules many, 2-seriate in the inner angles of the cells, anatropous. Capsule trigonous, 3-celled, loculicidal. Seeds many, testa thin or coriaceous; embryo immersed in the albumen, short, cylindric.—Genera 57. Species 800.—Tropical and temperate regions.

A. Stamens opposite to and shorter than the petaloid style-arms
 Stigmatic surface on the back of the petaloid style-arms .... IRIS
B. Stamens alternating with the style-arms
 1. Rootstock a tunicate corm. Stem absent. Perianth-tube long, slender .... CROCUS.
 2. Rootstock creeping. Stem erect. Perianth-tube very short .. BELAMCANDA.

Rhizome stimulant, emetic, cathartic, and sudorific. In some cases the stigmas of the flowers are stimulant and emmenagogue.

Colouring matters— α, β, γ—crocetin—, and toxic glucosides—crocin, iridin have been isolated.

OFFICIAL :—*Crocus autumnalis* Mill. and Brot.=*C. sativus* Allioni (Portugal); *C. sativus* Linn. (Austria, Belgium, France, Germany, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Switzerland, Turkey),= α. *autumnalis* Linn. (Sweden),=var. *culta autumnalis* (Denmark).

Iris florentina Linn., *I. germanica* Linn., and *I. pallida* Lam. in Austria, Belgium, Denmark, Germany, Holland, Hungary, Italy, Japan, Portugal, Russia, Sweden, Switzerland, Turkey

IRIS Linn.

Rootstock bulbous or creeping. Leaves equitant, ensiform. Perianth-tube long or short, segments large, outer (sepals) largest, stipitate, reflexed, inner (petals) usually smaller, suberect or reflexed. Stamens inserted at the base of the outer segments; anthers linear, basifixed. Ovary 3-gonous; style stout; stigmas petaloid, arching over the stamens, 2-fid and with a transverse dorsal crest, stigmatic surface a point below the crest. Capsule coriaceous, 3- or 6- ribbed. Seeds flat or globose, testa coriaceous or fleshy.—Species 200.—N. temperate.

1. Sepals neither crested nor bearded .... 1. *I. ensata.*
2. Sepals crested .... 2. *I. nepalensis.*
3. Sepals bearded .... 3. *I. kumaonensis.*
4. Lobes of stigma narrowly lanceolate .... 4. *I. soongarica.*

Rhizome stimulant, cathartic and diuretic.

The following species are used medicinally in Europe—*I. faetidissima* Linn., *I. florentina* Linn., *I. germanica* Linn., *I. pallida* Lam., *I. pseudacorus* Linn., *I. sambucina* Linn., *I. tuberosa* Linn.—; in China—*I. dichotoma* Pall., *I. ensata* Thunb.—; in North America —*I. versicolor* Linn.—.

Iridin, a toxic glucoside, has been obtained from several species.

OFFICIAL :—The rhizome of *I. florentina* Linn., *I. germanica* Linn., and *I. pallida* Lam. in Austria, Belgium, Denmark, Germany, Holland, Hungary, Italy, Japan, Portugal, Russia, Sweden, Switzerland, Turkey.

1. **Iris ensata** Thunb. in Trans. Linn. Soc. II, 328.—PLATE 954A.

A perennial herb. Rootstock stout, prostrate and creeping. Stems tufted, short, or 45-60 cm. high, stout or slender. Leaves 45 cm. by 6-8 mm., linear, rigid, grooved, greenish blue. Spathes 7.5-10 cm. long, 1-3-flowered. Flowers lilac or white, sepals and petals often with purplish veins, stalked. Perianth-tube absent; blade of sepals rhomboid-ovate, blunt, entire, shorter than the claw, neither crested nor bearded, 3.8-5 by 1.3-2 cm. Petals oblanceolate, erect, 6 mm. broad. Stamens 3, at the base of the outer perianth-segments; filaments distinct; anthers linear. Ovary 3-celled, 2.5 cm. long, cylindric; ovules many. Style linear, style-arms 3, 2.5 cm. long, linear, crests large, tip sharply bifid. Capsule 3.8-7.5 by 1.3-1.7 cm., 6-ribbed, beaked, ribs rounded.

Distribution: W. Himalaya, 5,000—9,000 ft.—Temperate Asia.

The root is chiefly used for its alterative properties, and enters into many compositions for purifying the blood and for venereal affections. It is also valuable in liver complaints and dropsy.

Bhote: Tesma—; *Chinese:* Li Shih, Ma Lien—; *Hindi:* Irisa, Sosun—; *Kashmir:* Krishun, Marjal, Unarjal—; *Persian:* Begbunufsha—.

2. **Iris nepalensis** Don. Prodr. 54 (non Wall.).—PLATE 955A.

A perennial herb. Rootstock stout, prostrate. Stems 15-30 cm. high, slender. Leaves 15-30 cm. long at the time of flowering, lengthening to 60 cm. by 6 mm. afterwards. Spathes 3.8-5 cm. long.

Flowers pale lilac, short-stalked. Perianth-tube 3.8 cm. long; limb 2.5-3.8 cm. long. Blade of sepals 13 mm. broad, oblong, as long as the claw, crest yellow. Petals 8 mm. broad, oblong. Style-arms 2.5 cm. long and less, deeply 2-lobed, margins toothed. Capsule 2.5-3.8 cm. long, oblong, enclosed in the persistent spathes.

Distribution: Temperate Himalaya 5,000—10,000 ft., Khasia Hills 5,000—8,000 ft.

The root is considered to be deobstruent, aperient, diuretic, especially useful in removing bilious obstructions. It is also used externally as an application to small sores and pimples.

Himalayas: Chalnundar, Chiluchi, Shoti, Sosan—.

3. **Iris kumaonensis** Wall. Cat. 5052.—PLATE 955B.

A perennial herb. Rootstock thick, creeping. Stems 5-30 cm. high, crowded. Leaves 10-35 cm. by 8 mm. at the time of flowering, lengthening afterwards, linear. Spathes 5-7.5 cm., often enveloped by the uppermost leaf. Perianth-tube 5-6.3 cm. long; limb bright lilac, 3.8-5 cm. long. Blade of sepals 2 cm. broad, mottled and bearded with a central line of yellow-tipped hairs. Blade of petals 13 mm. broad. Style-arms 2 cm. long, margins entire, the tip deeply 2-lobed and toothed. Capsule 2.5-5 cm. long, ovate, ends pointed.

Distribution: W. Himalaya, from Kashmir to Kumaon, 8,000—12,000 ft.

In Chumba, the root and the leaves are given in fever (Stewart).

Punjab: Karkar, Piaz, Tezma—.

4. **Iris soongarica** Schrenk Enum. I, 3.

Caespitose, rhizome short, neck clothed with the bases and fibres of all the leaves. Stem erect, few-leaved, terminal spathes 1-2 approximate. Leaves narrowly linear, firm, the radical ones surpassing the flowers. Spathes 1-3-flowered, valves lanceolate acuminate foliaceous; pedicel as long as the spathe. Perigone-tube 1½ times as long as the ovary; limb slightly longer than the tube, inner segments obovate, unguiculate, outer segments as long, oblanceolate unguiculate. Lobes of stigma narrowly lanceolate. Capsule trigonous-cylindrical.

Distribution: Baluchistan.—Afghanistan, Turkestan, Persia, Soongaria.

In Toba Achakzai, the roots are used powdered in curds to stop diarrhœa (Hughes-Buller).

Baluchistan: Gharwasha—; *Pushtu:* Gharwasha—.

Crocus Linn.

Rootstock a sheathed corm; stem 0. Leaves radical, narrowly linear, channelled, margins recurved. Flowers solitary or fascicled, subsessile; basal spathes 1-3 or 0 hyaline, floral embracing the ovary and sometimes a narrow hyaline bract. Perianth funnel-shaped, tube very slender; limb subequally 6-lobed in 2 series. Stamens on the throat of the perianth, filaments short, anthers longer, basifixed. Ovary 3-celled; style filiform, arms slender subentire lobed or laciniate; tips stigmatic. Capsule oblong, membranous, loculicidal. Seeds subglobose.—Species 60.—Mediterranean, Europe.

C. sativus Linn. is used medicinally in China.

Crocin, a toxic glucoside, has been obtained from several species.

Official :—The stigmas of *C. autumnalis* Mill. and Brot. (*C. sativus* Allioni) in Portugal; *C. sativus* Linn. in Austria, Belgium, France, Germany, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Switzerland, Turkey; *C. sativus* Linn. *a autumnalis* Linn. in Sweden; *C. sativus* Linn. var. *culta autumnalis* in Denmark.

1. **Crocus sativus** Linn. Sp. Pl. 36.—Plate 954B.

Sheaths of corm closely reticulate, basal spathes embracing the scape 2-valved. Flowers violet autumnal appearing with the leaves, throat of perianth bearded, anthers yellow, style-arms exserted orange-red subclavate tips entire or lobulate.

Distribution: Cultivated in Kashmir.—Native of S. Europe.

Saffron is bitter, pungent, fragrant; heating; alexiteric, anthelmintic, laxative, tonic; improves taste; useful in bronchitis, throat troubles, headache, hemicrania, vomiting, scabies, " tridosha ", biliousness, skin diseases, anuria, diseases of the brain (Ayurveda).

The leaves are vulnerary; useful in fractures and pain in the joints.—Saffron is bitter, fragrant; cooling; bechic, aphrodisiac, tonic, diuretic, laxative, galactagogue, intoxicant; lessens inflammation; useful in diseases of the kidney, the liver, the spleen, the brain; good in scabies; enriches the blood (Yunani).

As a medicine, saffron is used in fevers, melancholia, and enlargement of the liver. It has also stimulant and stomachic properties, and is highly thought of as a remedy for catarrhal affections of children.

Saffron is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Jafrana, Zahafaran—; *Bengal:* Jafran—; *Bhote:* Kurkum—; *Bombay:* Kessar, Kessara, Safran—; *Burma:* Thanwai—; *Canarese:* Kunkumakesari—; *Catalan:* Safra—; *Chinese:* Fan Hung Hua—; *Danish:* Safran—; *Dutch:* Saffran—; *English:* Saffron, Saffron Crocus, Spanish Saffron—; *French:* Safran, Safran cultivé, Safran d' Espagne, Safran du Gâtinais, Safran du Levant, Safran oriental, Safran de Sicile—; *German:* Safran—; *Greek:* Krokos—; *Gujerati:* Keshar—; *Hebrew:* Karkom—; *Hindi:* Kesar, Zafran—; *Italian:* Giallone, Groce, Grogo, Grotago, Zafferano, Zafferano autunnale, Zafferano fior cuculo, Zafferano sulmonese—; *Kashmir:* Kong—; *Marathi:* Kesara—; *Pavia:* Safran—; *Persian:* Larkimasa, Zaafaran—; *Piedmont:* Safran, Soufram—; *Polish:* Szafran—; *Portuguese:* Acafrao—; *Potenza:* Castagnola—; *Puglia:* Castagnole—; *Russian:* Schafran—; *Sanskrit:* Agnishekhara, Agnishikha, Aruna, Asra, Asrika, Balhika, Chandana, Charu, Dhira, Dipaka, Gaura, Ghasra, Ghusruna, Harichandana, Jaguda, Kaisara, Kaleyaka, Kanta, Kashmara, Kashmiraja, Keshara, Khala, Kunkuma, Kusumatmaka, Lohita, Pishuna, Pitaka, Pitana, Raja, Rakta, Raktachandana, Raktasanjna, Ruchira, Rudhira, Sankocha, Sankochapishuna, Saubhara, Shatha, Shonita, Shonitavhaya, Vara, Varabalhika, Varenya, Vira—; *Spanish:* Azafran—; *Swedish:* Saffran—; *Tamil:* Kungumapu—; *Telugu:* Kunkumapave—; *Treviso:* Safferian—; *Turki:* Zafar—; *Tuscany:* Croco, Giallone, Grogo, Grotago, Gruogo domestico, Zafferano ambrosino, Zafferano domestico—; *Urdu:* Jafranekar—; *Verona:* Safran—.

BELAMCANDA Adans.

Rootstock creeping; stem erect, leafy. Leaves ensiform, equitant. Inflorescence branched, sheaths membranous; spathes several-flowered, subscarious; bracts scarious; flowers pedicelled. Perianth-tube very short; segments oblong, spreading, subequal. Stamens inserted at the base of the perianth, filaments filiform, anthers linear basifixed. Ovary obovoid; style filiform, arms elongate, tips reniform stigmatic. Capsule obovoid, membranous, loculicidal, valves reflexed, leaving the seed-bearing axis persistent and free. Seeds subglobose, testa lax shining fleshy within.—Species 1.—E. Asia.

B. chinensis Leman is used medicinally by the Zulus.

1. **Belamcanda chinensis** Leman in Red Lil. t. 121.—PLATE 954C.

Characters of the genus.

Distribution: Doubtfully wild in the Himalaya up to 6,000 ft. Cultivated all over India.—A native of China.

The root is used as an alexipharmic in Malabar, being given to those who have been bitten by the cobra, and to cattle who have fed upon poisonous plants (Rheede).

In Lakhimpur, the pulp of the stem is said to cure stomachache (Carter).

The roots are used medicinally in Chochin-China. They have aperient and resolvent properties and purify the blood of gross humours, being specially useful in cynanche.

The rhizome is an important drug in China where it is recommended as expectorant, deobstruent, and carminative. It is given in pulmonary and liver complaints and for purifying the blood. In Malaya, it is a remedy for gonorrhoea.

It is employed by the Zulus in treating hysteria in young women.

Assam: Surjakanti—; *Cantonese:* She Kon—; *Chinese:* She Kan, Yieh Kan—; *English:* Leopard Lily—; *Malaya:* Siai Kan—; *Zulu:* inDawoluthi-emnyama—.

AMARYLLIDACEAE.

Perennial herbs (rarely shrubs or undershrubs). Rootstock a bulb, tuber or corm, rarely an erect stock. Leaves radical. Scape naked (in the Indian genera). Flowers few, often umbellate; bracts membranous or coloured (rarely herbaceous), the outer under the umbel 1-3-(rarely many-) involucrate; occasionally the inflorescence racemose or paniculate with scattered bracts. Perianth regular or irregular, 2-seriate, 6- lobed or -partite, sometimes with a corona at the mouth of the tube. Stamens 6, adnate to the bases of the perianth-segments, rarely epigynous; filaments free or connate; anthers erect or versatile. Ovary 3-celled, inferior; ovules many, anatropous, 2-seriate on the inner angles of the cells; style slender; stigma simple or 3-cleft. Fruit inferior, usually a loculicidal capsule, rarely fleshy and bursting irregularly. Seeds few or many; albumen fleshy, enclosing the small embryo.—Genera 90. Species 1050.—Usually tropical or subtropical.

A. Very robust plants with large thick fleshy or coriaceous often spinose leaves. Scape very large or gigantic .... AGAVE.
B. Herbaceous plants with tuberous or pseudobulbous rhizome. Flowers paired in each bract on a long raceme. Perianth-tube long, dilated above .... POLIANTHES.
C. Scape with usually many flowers in the umbel. Flowers sessile or nearly so. Perianth-tube long, usually narrow .... CRINUM.
D. Leaves usually plicate and petioled. Scape very short. Flowers usually yellow. Hypanthium produced into a beak above the ovary. Fruit indehiscent .... CURCULIGO.

Mucilaginous and acrid, bitter and emetic.

The alkaloid lycosine occurs in a large number of plants belonging to this Order; other alkaloids present are buphanine and sekisanine.

AGAVE Linn.

Stout shrubby rhizomatous plants with a short aerial stem more or less concealed by the leaf-bases, and with thick fleshy spine-tipped and often spinosely toothed rigid leaves. Hypanthium produced into a short stout beak above the ovary. Perianth more or less funnel-shaped or campanulate with the tube short or very short, rarely elongated, lobes linear, erect or spreading. Stamens inserted at the base of the petals and considerably longer than these with filaments filiform or flattened at the base, anthers large linear, fixed by the middle of the back. Ovary often fleshy 3-locular, style filiform above the short conical base. Ovules very numerous in each cell. Fruit an ovoid globose or cylindrical coriaceous erect beaked capsule, crowned at first by the sub-persistent perianth, loculicidally dehiscent at the apex. Seeds numerous, flattened, closely superposed with black testa.—Species 150.—Tropical America and Southern United States.

1. Leaves very stout, commonly variegated yellow, sharply constricted into a neck just above the very swollen base .... 1. *A. americana.*
2. Leaves dagger-like or sword-shaped, grey-green with flat non-decurrent spines and slender cusped bristles .... 2. *A. angustifolia.*
3. Leaves oblong-lanceolate, margins not or only slightly sinuate. Apical spines dark brown .... 3. *A. vera-cruz.*

The roots and leaves exhibit diuretic, antiscorbutic and anti-syphilitic properties.

The following species are used medicinally in North America—*A. americana* Linn., *A. mexicana* Lam., *A. virginica* Linn.—; in Santo Domingo—*A. vivipara* Linn—; in Guiana—*A. americana* Linn—; in South Africa—*A. americana* Linn.—; in Cambodia—*A. americana* Linn.—.

1. **Agave americana** Linn. Sp. Pl. (1753) 323.—Plate 956B.

Leaves very stout, commonly variegated yellow, sharply constricted into a neck just above the very swollen bases, margin distinctly sinuate and bearing the mostly reflexed spines on the eminences, apical spine 2.5-5 cm. long.

Distribution: Tropical America.—Cultivated in India.

The roots are diuretic, diaphoretic, and anti-syphilitic, and much used in Mexico, Guiana and other parts of America.

The expressed juice of the leaves is administered by American doctors as a resolvent and alterative, especially in syphilis, scrofula and even cancers. It is considered to be laxative, diuretic, and emmenagogue.

A thin slice of the large fleshy leaves constitutes a good poultice. The fresh juice is applied to bruises and contusions.

The gum found exuding from the leaves and the lower part of the stem is used in Mexico as a cure for toothache.

The plant is extensively grown in Mexico for the sake of the juice of the stalk from which a fermented intoxicating drink is made.

A good detergent soap has been prepared from the leaves.

The plant is now widely distributed in South Africa where it is also used medicinally. The leaves are heated and split, and applied in rheumatism to relieve pain. An infusion of the cut-up leaves is used as a purgative. In the Karroo, farmers make a dryish extract from the leaves for purgative use in animals, especially ostriches. The ground-up leaves are added by natives to powdered tobacco in making snuff.

The plant is used as a fish poison in some countries.

The core is used medicinally in Cambodia. It is given internally as a febrifuge in malaria and various other fevers; externally it is applied to wounds as an antiseptic and tonic.

Afrikaans: Gareboom, Garingboom—; *Arabic:* Seubbara—; *Bengal:* Banskeora, Bilatiananash, Bilatianaras, Bilatipat, Jungliananash, Junglianaras, Koyan, Murgamurji—; *Cambodia:* Nil pisey—; *Canarese:* Anekatalle, Anekattali, Bhutale, Devvabale, Kaluaru, Rakshasabale—; *Catalan:* Atsavara, Pita—; *Cebu:* Pita—; *Deccan:* Rakaspatta—; *English:* American Aloe, Century Plant—; *French:* Abécédaire, Acamelt, Agave, Agave américain, Agave d' Amérique, Aloès americain, Aloès bleu, Bois de chambre, Bois de chandelier, Bois chandelle, Bois de lumière, Chanvre américain, Chanvre des Indiens, Sequamelt, Vigne du Mexique—; *French Guiana:* Aloès—; *Gujerati:* Janglikunvara—; *Hindi:* Banskeora, Barakanwar, Bilatipat, Hathisengar, Kantala, Rakaspattah, Ramkanta—; *Hyderabad:* Ketgi—; *Italian:* Agave—; *Konkani:* Reddionossi, Redonossy—; *La Reunion:* Aloès bleu, Cadère—; *Malayalam:* Airoppakkaita, Nattukaita, Panankattaa—; *Malta:* Century Plant—; *Marathi:* Ilaitikedara, Rakaspatta, Vilayatikorkand—; *Philippines:* Maguey, Muguey, Nipis—; *Porebunder:* Ketki, Vilayatiketki, Vilayatikunwar—; *Portuguese:* Piteira—;

Punjab: Wilíyatikaitalu—; *Russian:* Agave, Amerikanskaloi, Stolyetnik—; *Sanskrit:* Kalakantala, Kantala—; *South Africa:* Agave, American Agave, American Aloe, Century Plant—; *Spanish:* Pita—; *Tamil:* Alagai, Anaikkattalai, Kattukkatalai—; *Telugu:* Kittanara, Piyyatikalabanda, Rakshasimatta—; *Tulu:* Anemundai, Daddoli—; *Uriya:* Brihotokumari, Kolakantolo—; *Visayan:* Magai—.

2. **Agave angustifolia** Haw. Syn. Succ. 72.—*A. vivipara* Auct.; Wight Ic. 2024.—*A. ixtlioides* Hook. f. Bot. Mag. t. 5893.—*A. Wightii* Prain.

Short-trunked. Leaves dagger-like or sword-shaped, 8 by 40-60 cm., grey-green, with flat, non-decurrent spines and slender-cusped prickles. Inflorescence few-branched. Flowers rather large, greenish, long-lobed, ill-smelling, often followed by bulbils, 4-5 cm., urceolately contracted in throat, segments and ovary 2 cm. each, tube 12 mm. Capsule subglobose, strongly stipitate and beaked. Seeds very large.

Distribution: Tropical America.

The roots are diuretic and diaphoretic.

The fresh juice of the leaves is applied to bruises.

English: Bastard Aloe—; *Oudh:* Hathichingar, Khetki—; *Sanskrit:* Kantala—; *Tamil:* Erumaikkattalai, Malaikkattalai, Piramarakkadi—; *Telugu:* Balurakkasi, Balurakkisa, Brahmarakasi, Kittanara, Peddakalabanda, Piyyatikalalebanda, Samata—.

3. **Agave vera-cruz** Mill. Gard. Dict. ed. 8 (1768) no. 7.

A stout plant usually producing numerous shoots from the rhizome, which render it polycarpic. Leaves very deep green and glaucous, linear-oblong, 1.2-1.8 m. long and attaining 25 cm. in width, scarcely constricted above the base, margins not or only slightly sinuate, apical spine 1.3-2.5 cm. long, dark brown.

Distribution: Native country probably Mexico.—Commonly naturalized in India.

The plant is used as a purgative at Nasirabad (Hughes-Buller).

Nasirabad: Kuwarbuti—.

CURCULIGO Gaertin.

Herbs with a tuberous rootstock or a tunicate corm. Leaves lanceolate and plicate, or linear and flat, often large. Flowers spicate, racemose or subcapitate, the lower flowers usually 2-sexual, the upper often male. Perianth 6-partite, separated from the ovary by a short or long solid stipe bearing the rotate limb. Stamens 6, adnate to the base of the perianth-lobes; filaments short; anthers linear, erect. Ovary inferior, 3-celled, with a short or long beak; ovules 2 or more in each cell, with a distinct, often long funicle; style short, columnar; stigmas 3, oblong, erect, appressed. Fruit an indehiscent berry. Seeds subglobose; testa crustaceous, black, often beaked.—Species 15. —Palæotropics, S. Africa.

The root is reconstructive, rejuvenating, aphrodisiac, and tonic.

C. ensifolia R. Br. is used medicinally in China and Malaya; *C. corzoneraefolia* Baker in Guiana.

1. **Curculigo orchioides** Gaertn. Fruct. I (1788) 63, t. 13.—*C. malabarica* Wight Ic. t. 2043, f. 1.—PLATE 956A.

Rootstock stout, short or elongate (sometimes 30 cm. long), with copious fleshy root-fibres. Leaves sessile or petiolate, 15-45 by 1.3-2.5 cm., linear or linear-lanceolate, membranous, plicate, glabrous or sparsely softly hairy, the tips sometimes rooting and reaching the ground, base sheathing. Scape very short, clavate, flattened, with the pedicels, bracts and ovary hidden among the leaf-sheaths. Flowers bright yellow, distichous, the lowest in the raceme 2-sexual, the upper male; bracts lanceolate, membranous. Perianth-segments 13-17 mm. long, elliptic-oblong, acute, hairy on the back, the stipes (the long slender beak of the ovary) very slender, 1.3-2.5 cm. long, which alone with the perianth appears above ground. Stamens small; filaments very short; anthers linear. Ovary lanceolate, the cells 6-8-ovulate; stigma 3-cleft. Capsules 13 mm. long, hypogaeous, 1-4-seeded, with a slender beak; septa spongy. Seeds oblong; testa deeply grooved in wavy lines, black, shining.

Distribution: Bengal, Assam, W. Peninsula.—Java.

The root is bitter, sweet; heating, aphrodisiac, alterative; appetiser, fattening; useful in piles, "vata" complaints, biliousness, fatigue, diseases of the blood (Ayurveda).

The root is bitter, sweet; carminative, tonic, aphrodisiac, antipyretic; useful in bronchitis, ophthalmia, indigestion, vomiting, diarrhœa, lumbago, dyspnoea, gonorrhœa, gleet, hydrophobia, pains in the joints (Yunani).

The rhizome is prescribed for asthma, piles, jaundice, diarrhœa, colic, and gonorrhœa; it is considered to be demulcent. diuretic, tonic and aphrodisiac, and is often combined with aromatics and bitters.

The powdered rhizome put into cuts is said to stop bleeding and to dry up the wounds (Carter).

Art Island: Tao—; *Bengal:* Talamuli, Talusa—; *Bombay:* Kalimusli, Mushali, Muslikand, Siyahmusli—; *Canarese:* Nelatatigadde—; *Central Provinces:* Mussulkund—; *Gond:* Musarkand—; *Gujerati:* Kalimusli—; *Hindi:* Kalimusli, Mushali, Muslikand, Siyahmusli—; *Lakhimpur:* Nagini—; *Malayalam:* Nelappanakizhanna—; *Marathi:* Kalimusali—; *Mundari:* Serengjadu—; *Persian:* Musali—; *Sanskrit:* Arshoghni, Bhutali, Dirghakandika, Godhapadi, Hemapushpi, Kanchanapushpika, Khalani, Kharjuri, Mahavrishya, Musali, Suvaha, Talamuli, Talamulika, Talapatrika, Tali, Talika, Vrishyakanda—; *Sinhalese:* Hinbintal—; *Tamil:* Nilappanaikkilhangu—; *Telugu:* Nallatadigudda, Nelatadi, Nelatatigaddalu, Nilaptaligaddalu—; *Urdu:* Musali—.

CRINUM Linn.

Herbs with large tunicated bulbs, the bulbs often produced into a long or short neck. Leaves numerous, elongate, lorate or ensiform. Scape solid. Flowers large, umbellate; bracts 2, spathe-like; bracteoles liner. Perianth funnel- or salver- shaped; tube long, straight or incurved; lobes 6, linear-lanceolate or oblong, spreading or conniving. Stamens 6, on the throat of the perianth-tube; filaments free, filiform; anthers linear, dorsifixed. Ovary 3-celled; ovules few or many in a cell; style filiform; stigma minute, subcapitate. Capsule irregularly subglobose, membranous or coriaceous, bursting irregularly. Seeds few, large, rounded; testa thick; albumen copious, fleshy. —Species 70.—Tropics and subtropics, especially on seacoasts.

A. Leafy stem not dying down annually. Flowers white, with the leaves	
1. Erect caulescent. Leaves 10-18 cm. wide	1. *C. asiaticum.*
2. Prostrate or aquatic or at least scape declinate. Leaves under 7.5 cm. wide	3. *C. defixum.*
B. Leaves dying down annually. Flowers before leaves are mature, very large, with sepals 2.5 cm. broad, often rosy	2. *C. latifolium.*

Bulbs powerfully emetic.

. *C. asiaticum* Roxb. is used medicinally in the Philippine Islands and in the Islands of the Malay Archipelago; *C. asiaticum* Roxb. & *C. defixum* Ker.-Gawl. in Madagascar; *C. giganteum* Andr. and *C. sanderianum* Baker in Guinea; *C. longifolium* Thunb. in South Africa.

1. **Crinum asiaticum** Linn. Sp. Pl. (1753) 292.—*C. toxicarium* Roxb. Fl. Ind. II (1832) 134; Wight. Ic. tt. 2021-2.—PLATE 957.

Bulb 5-10 cm. diam., narrowed into a neck 15-30 cm. long, which is clothed with old leaf-sheaths. Leaves 20-30, thin, 0.9-1.5 m. by 12.5-18 cm., linear-lanceolate, shortly acuminate, flat, narrow, with a sheathing base, bright green with smooth margins. Scape 45-90 cm., reaching 2.5 cm. diam. Flowers white, fragrant at night, 15-50 in an umbel; bracts 7.5-10 cm. long; pedicels 6-25 mm. long. Perianth-tube greenish white, 7.5-10 cm. long, cylindric, slender; lobes nearly as long as the tube, linear, recurved or revolute. Stamens reddish; filaments slender, shorter than the lobes of the perianth; anthers 1.3-2 cm. long. Fruit subglobose, 2.5-5 cm. diam., 1- (rarely 2-) seeded, beaked by the fleshy base of the perianth, dehiscing irregularly.

Distribution: Throughout tropical India, Ceylon. Wild or cultivated.

The tuber is pungent, bitter, heating; vulnerary, laxative, carminative, antipyretic, anthelmintic; useful in biliousness, strangury, snake-bite, vomiting, urinary discharges, tumours, diseases of the vagina, the abdomen, the blood (Ayurveda).

The tuber is bitter; tonic, expectorant, laxative, aphrodisiac; useful in bronchitis and diseases of the chest and lungs, gonorrhœa. night blindness and defective vision, diseases of the spleen, urinary concretions, lumbago, anuria, toothache, snake-bite, bad smell of perspiration.—The seeds are bitter; purgative, diuretic, emenagogue, tonic; useful in diseases of the kidney and in furunculosis (Yunani).

The fresh root is emetic, in small doses nauseant, and diaphoretic.

In Lakhimpur, the leaves are applied to skin diseases (Carter).

The leaves bruised and mixed with castor oil useful in whitlows and local inflammations. The juice of the leaves is used in earache. In Java, it is used as an emetic.

The root is considered in Malaya an antidote to the ipoh poison.

A decoction of the leaves is used as an expectorant in the Philippine Islands. The powdered root is a popular alexipharmac.

The root is not an antidote to snake-venon (Mhaskar and Caius).

Arabic: Haliyaon—; *Bengal:* Barakanur, Bodakanod, Gaerhonarpatta, Nagdaun—; *Bombay:* Nagdown—; *Burma:* Koyangi—; *Canarese:* Vishamungali—; *Ceylon:* Vishamungil—; *Chinese:* Ouen Chou Lan—; *Cochin China:* Mansylan—; *Deccan:* Naginkapatta—; *Dutch:* Spatwortel—; *Gujerati:* Nagdamani—; *Hindi:* Chindar, Kanmu, Kanwal, Pindar—; *Lakhimpur:* Kaneripat—; *Malay:* Bakoeng—; *Marathi:* Nagadavana—; *Persian:* Marchobia—; *Sanskrit:* Bala, Durdharsha, Dusaha, Jambati, Jambu, Kandashalini, Mahayogeshvari, Malaghni, Mota, Nagadamani, Nagapatra, Nagapushpi, Raktapushpi, Shrikanda, Vanakumari, Viphala, Vishamandala, Vishamardini, Vishapaha, Vishari, Vishavinashini, Vrikka, Vritta, Vrittapushpa--; *Sinhalese:* Tolabo—; *Tagalog:* Bacong—; *Tamil:* Vishamungil—; *Telugu:* Kesarchettu, Lakshminarayanachettu, Vishamungali—; *Urdu:* Nagadaman, Nagadauna—; *Visayan:* Agubahan, Bacung, Palagucon, Salibangbang—.

2. **Crinum latifolium** Linn. Sp. Pl. (1753) 291.—*C. zeylanicum* Linn. Syst. ed. 12 (1767) 236.—PLATE 959.

Bulb large, subglobose, 12.5-15 cm. diam.; neck short, stout. Leaves numerous, 60-90 by 7.5-12.5 cm., lorate, acuminate, bright green, the margins slightly scabrous. Scape inserted on the neck of the bulb, about as long as the leaves, stout, tinged with purple. Flowers fragrant, white, streaked or tinged with purple down the middle, in 10-20-flowered umbels; pedicels very short; bracts 7.5-10 cm. long, oblong-lanceolate. Perianth-tube 7.5-15 cm. long, curved, cylindric; lobes 7.5-10 by 2.5 cm., oblong-lanceolate, acute, much longer than the stamens. Stamens declinate, much shorter than the perianth-lobes; filaments 6.3-7.5 cm. long; anthers 1.3-2 cm. long, grey. Style longer than the stamens. Ovary with 5-6 superposed ovules in each cell. Fruit subglobose, 3.8-5 cm. diam.

Distribution: Throughout India, Burma, Ceylon, Wild or cultivated.

The tuber is fragrant and heating; used in "vata", bronchitis, and inflammation (Ayurveda).

The bulb is extremely acrid, and is used for blistering cattle, a slice being bound upon the skin. When roasted, it is used as a rubefacient in rheumatism. The juice of the leaf is used in earache.

The crushed and toasted bulb is applied to piles and abscesses to cause suppuration.

Bengal: Sukhdarsan—; *Bombay:* Gadambikanda—; *Sanskrit:* Chakrangi, Chakraoha, Dadhyani, Madhuparnika, Somavalli, Sudarshana, Vrishakarni—; *Sinhalese:* Godamanil, Tolabo—; *Tamil:* Vishamungil—.

3. **Crinum defixum** Ker in Quarterly Journ. of Sc. & Art. III (1817) 105; Bot. Mag. t. 2208.—Rheede Hort. Mal. XI, 38.

Bulb globose or oblong, 7.5-10 cm. diam., base stoloniferous, neck stout, 5-15 cm. long. Leaves few or many, 60-90 by 2-3.8 cm., linear, obtuse or acute, concave, thick, dark green, margins slightly rough; scape from the axils of the lowest leaves, 45-75 cm., erect, cylindric, bracts 2, 3.8-5 cm., oblong-lanceolate, subacute, bracteoles filiform. Umbel 6-15-flowered, pedicels very short; tube of perianth 6.3-12.5 cm., slender, cylindric, segments nearly as long, narrowly linear-lanceolate, subacute, reflexed or drooping; filaments shorter than perianth-segments, spreading bright red, anthers 13 mm.; style declinate, stigma simple. Fruit subglobose, 2.5 cm. diam., shortly pedicelled, beaked by the perianth tube, 1-celled, 1- or more- seeded, pericarp membranous. Seeds rugose.

Distribution: Swampy river-banks throughout India, Ceylon.

The bulb is emollient and emetic; in small doses it is a nauseant and diaphoretic.

The bulb and stolon are very much used in Madagascar, both internally and externally, for the treatment of burns, whitlow, and carbuncle. In otitis a few drops of the juice of the leaves are instilled into the ear.

Bengal: Sukdarshan—; *Betsileo:* Vahondrahona—; *Betsimisaraka:* Kingatsa—; *Bombay:* Nagdown—; *Gujerati:* Nagrikand—; *Hova:* Tsingatsa, Vahondrano—; *Madras:* Vishamungil—; *Mundari:* Kendari, Kendarijadu, Marangjadu—; *Sinhalese:* Hintolabo—; *Telugu:* Kesarchettu—.

POLIANTHES Linn.

Erect, leafy, unbranched plants from tuberous rootstocks. Leaves linear, basal and scattered along the stem. Inflorescence terminal, spicate, the bracts persistent. Perianth with a long, narrowly funnel-shaped, curved tube, and short, unequal segments. Stamens inserted at the middle of the tube, not exserted. Ovary 3-celled, free at the apex; ovules many; style filiform. Fruit ovoid, crowned by the persistent perianth.—Species 3.—Central America.

The genus is therapeutically inert.

1. **Polianthes tuberosa** Linn. Sp. Pl. 316.

Rootstock stout, tuberous. Basal leaves linear, 40-60 cm. long, less than 1 cm. wide, those on the stem much shorter. Stems erect, 0.5-1 m. high. Flowers fragrant, waxy-white, in pairs, 5-6 cm. long, the segments oblong-lanceolate, 1-1.5 cm. long.

Distribution: A native of Mexico. Now cultivated in most warm countries.

The flowers are considered diuretic and emetic.

The bulbs, after being dried and powdered, are used as a remedy for gonorrhœa.

In the Konkan, when rubbed up with turmeric and butter, the bulbs are applied to remove small red pimples which often trouble new-born children. They are also rubbed into a paste with the juice of *Cynodon dactylon* and applied to buboes.

Bengal: Rajanigandha, Runjuni—; *Bombay:* Gulcheri—; *Burma:* Hnenben—; *Catalan:* Vara de Jesse—; *Cebu:* Nardo—; *Dutch:* Tuberoos—; *English:* Tuberose—; *French:* Amica nocturna, Jacinthe du Cap des Indes, Tubereuse—; *German:* Tuberose—; *Hindi:* Gulcheri, Gulshabba, Gulshabbo—; *Italian:* Tuberosa—;

Philippines: Azucena—; *Portuguese:* Tuberosa—; *Punjab:* Gulshabbo—; *Roumanian:* Tuberoasa—; *Russian:* Tuberoza—; *Sanskrit:* Rajanigandha—; *Spanish:* Tuberosa, Vara de Jese—; *Telugu:* Nelasampenga, Verusampenga—.

TACCACEAE.

Perennial herbs; rootstock tuberous or creeping. Leaves radical, large undivided and costate, or pinnately lobed and reticulately veined; petiole long. Flowers hermaphrodite, regular, densely umbellate on the top of a long naked scape; outer bracts 2-6 (usually 4), leafy and broad, forming an involucre, sometimes coloured; inner bracts (bracteoles) under the pedicels many, long, filiform, pendent. Perianth usually lurid, superior, urceolate or subcampanulate, biseriately 6-lobed. Stamens 6, adnate to the perianth-tube or to the base of the perianth-lobes included; filaments very short, dilated or laterally appendaged at the base, cucullate above the anthers, with 2 ribs or horns on the inner face; anthers 2 celled, sessile within the hood. Ovary inferior, 3-angular, 1-celled; ovules many, on 3 parietal placentas, anatropous or almost amphitropous; style short, included; stigmas 3, often petaloid, broad, 2-fid, and inflexed like an umbrella over the style. Fruit globose, ovoid, turbinate or oblong, 3-6-ribbed, forming an indehiscent berry or rarely a 3-valved capsule. Seeds numerous, ovoid, compressed, longitudinally striate; albumen hard; embryo minute.—Genera 2. (In India only one genus). Species about 30.—Tropics.

Rubefacient. They yield excellent arrowroot.

TACCA Forst.

Characters of the family.

1. Leaves 3-partite	....	1. *T. pinnatifida.*
2. Leaves entire	....	2. *T. aspera.*

1. **Tacca pinnatifida** Forst. Char. Gen. (1778) 70, t. 35.

Rootstock globose, 15-25 cm. diam.; rootlets superficial. Leaves 30-90 cm. diam., circular in outline, 3-partite, the segments variously pinnatifid, margins undulate; petioles 30-90 cm. long, terete, striate, hollow. Scape longer than the petiole, tapering upwards, terete, with pale and dark green stripes, 10-40-flowered. Flowers pedicellate, drooping, about 17 mm. across, green tinged with purple; involucral bracts 6-12, oblong-lanceolate, acuminate, recurved, striped with purple; bracteoles filiform, numerous, very much longer than the bracts. Perianth subglobose, greenish; lobes margined with purple, connivent. Fruit of the size of a pigeon's egg, yellow, 6-ribbed. Seeds angular.

Distribution: Bengal, Central India, W. Peninsula, Ceylon.—Malay, Pacific Islands, Australia.

The root-stock is intensely bitter when raw. It is full of starch, which, when prepared, is of excellent culinary properties, and is far preferable to that of any other arrowroot for dysentery.

Bombay: Diva, Divakanda—; *Burma:* Pankhade, Pembwau, Toukta, Touta—; *Deccan:* Barakanda—; *English:* Indian Arrowroot, South Sea Arrowroot—; *Ewe:* Dzogbenyabo—; *Hausa:* Amara, Gatarinzomo, Gigynyarbiri—; *Hova:* Tavolo—; *Ilocano:* Panarien, Pannirien—; *Katagum:* Tarayaga, Yagu—; *Malay:* Lukeh—; *Malayalam:* Chanekizhanna—; *New Caledonia:* Haolan—; *Sakalave:* Kabija, Konitso—; *Santali:* Dhai—; *Sinhalese:* Gerandikidaran—; *Tamil:* Karachunai, Periyakarumeikkilhangu—; *Telugu:* Chandà, Kanda, Peddakandagadda—; *Visayan:* Canobong, Magsalorongadacu, Tayobong—.

2. **Tacca aspera** Roxb. Hort. Beng. (1814) 25 (nomen); Fl. Ind. II (1832) 169.

Rootstock oblong, curved. Leaves entire, elliptic-ovate, acuminate, 20-40 by 10-20 cm., strongly nerved and bullate; petiole shorter than the blade and scape maroon-brown. 2 inner involucral-leaves very large, spreading foliaceous petioles slender; 2 outer smaller sessile ovate-acuminate. Scape about as long as the petiole, stout, recurved or bent to one side, few-flowered. Flowers pale, perianth greenish purple and yellow or dirty lilac, outer lobes subacute, rather shorter than the obtuse inner; mouth obscurely thickened and ridged, all at length reflexed. Ovary turbinate, deeply grooved. Berry almost 4 cm. long, oblong, fleshy.

Distribution: Burma, Chittagong, Tenasserim, Malay Peninsula.

The tuber is sweet; nourishing, digestive; tonic; useful in hæmorrhagic diathesis, skin diseases, leprosy (Ayurveda).

Bengal: Varahikanda—; *Hindi:* Varahikanda—; *Marathi:* Dukarkanda—; *Sanskrit:* Sukarakanda, Varahikanda—.

BROMELIACEAE.

Terrestrial or epiphytic herbs. Leaves long, narrow, chiefly basal, rosulate, entire or spiny-toothed, base usually spreading. Flowers perfect, regular, in dense, terminal spikes, the bracts usually prominent. Sepals 3, free or partly united. Petals 3, free or somewhat united. Stamens 3 to 6, free or somewhat united with the petals. Ovary inferior or superior, 3-celled; styles united; stigmas 3-lobed; ovules many. Fruit of numerous, fleshy, united berries or a 3-valved capsule.—Genera 65. Species 850.—Tropical America, West Indies.

In general, the fruits are acid, astringent, diuretic, and vermifugal.

A proteolytic ferment, bromelin, has been found in the juice of the pineapple.

ANANAS Tourn. ex. Linn.

A herb with numerous, elongated, finely toothed, rosulate leaves. Scape short or somewhat elongated, leafy, erect, central, bearing at its apex a simple, dense, cone-like spike. Flowers in the axils of the bracts, perfect. Sepals short, imbricate. Petals violet, free, erect, supplied at the base with 2 small scales. Stamens 6. Ovary inferior, fleshy, the base broad, adnate to or immersed in the fleshy rhachis; style filiform. Fruit fleshy, cone-like, composed of the densely spirally arranged, connate, mature ovaries and fleshy rhachis, the bracteoles persistent, and crowned by a rosette of reduced leaves.—Species 5.—Tropical America.

A. sativus Schult. is used medicinally in Combodia, Brazil, and the Gold Coast.

1 **Ananas sativus** Schult. f. Syst. VII (1830) 1283.

Leaves numerous, linear-lanceolate, 1-1.5 m. long, 5-7 cm. wide, acuminate, the margins sharply spiny-toothed, green and shining on the upper surface, the lower surface pale beneath, those subtending the inflorescence red, at least at the base, much reduced. Stem erect, 0.5-1.5 m. high. Heads terminal, solitary, ovoid, 6-8 cm. long, much enlarged in fruit; bracteoles reddish, numerous, triangular-ovate to oblong-ovate, acute, imbricated. Sepals 3, ovate, thick, fleshy, about 1 cm. long. Petals 3, oblanceolate, about 2 cm. long, white below, violet-purple above. Mature fruit up to 20 cm. long or more.

Distribution: Tropical America.—Cultivated in India and elsewhere.

The unripe fruit is digestive; useful in cardiac disorders and in fatigue; causes "kapha" and biliousness.—The ripe fruit is sweet; useful in diseases of the blood; causes biliousness (Ayurveda).

The fresh juice of the leaves is regarded as a powerful anthelmintic, and that of the fruit as an antiscorbutic.

In the Straits of Malacca, the juice of the leaves is used to produce abortion, also as an emmenagogue.

Malay women sometimes use the fruit in its unripe state as an abortifacient; a young green pineapple about half-grown is either eaten raw or the fruit is sucked so as to absorb the juice.

In Cambodia, the fruits and roots are considered diuretic. They are given in blennorrhagia and renal lithiasis.

In the Gold Coast, the immature fruits are cut up and boiled and taken internally for venereal diseases. The juice extracted from a roasted fruit is used in preparing a gruel which is given to children and sick persons.

Arabic: Aainunnas—; *Bengal:* Ananash, Anaras—; *Brazil:* Ananas, Nana—; *Burma:* Nannati—; *Camarines:* Malisa—; *Cambodia:* Mneas—; *Canarese:* Ananasuhannu—; *Catalan:* Pina de America—; *Dutch:* Ananas, Pijnappel—; *English:* Ananas, Pineapple—; *Ewe:* Ablairndi, Atortor—; *Fanti:* Abreba—; *French:* Ananas, Ananas a couronnes, Ananas comestible, Ananas cultive, Attier, Chardon du Bresil—; *Ga:* Blorfongme—; *German:* Ananas—; *Greek:* Ananas—; *Gujerati:* Ananas—; *Hindi:* Ananas, Anannas—; *Hova:* Manananassy—; *Ilocano:* Pita—; *Italian:* Ananas, Ananasso—; *Konkani:* Anenes—; *Krepi.* Ablairndi—; *Krobo:* Blairfota—; *Kyerepon:* Ablairmmair *La Reunion:* Ananas—; *Malay:* Nanas—; *Malayalam:* Annanas, Kaitachakka—; *Marathi:* Ananas—; *Mundari:* Bilaitkantara—; *Persian:* Ainunnas—; *Philippines:* Pina—; *Portuguese:* Ananaz—; *Roumanian:* Ananas—; *Russian:* Ananas—; *Sanskrit:* Ama, Anannasa, Kautukasanjaka, Paravati—; *Sinhalese:* Annasi—; *Spanish:* Ananas, Pina, Pina de America—; *Tamil:* Anassappalam—; *Tanala:* Voafondrana—; *Telugu:* Anasapandu—; *Twi:* Aborobair—.

DIOSCORIACEAE.

Large, usually climbing herbs with generally a thick fleshy tuberous underground rootstock (rarely a cluster of tuberous roots). Leaves alternate or opposite, simple or compound, costate and reticulate; petioles often angular and twisted at the base. Flowers small, usually 1-sexual, spicate or racemose, dioecious or monoecious in separate spikes, regular; bracts small, often minute, sometimes obsolete; male spikes or racemes simple or paniculate; female simple, sometimes reduced to 1-2 flowers; perianth superior, 6-lobed, in 2 series. Male flowers: Perianth campanulate or rotate, deeply 6-fid, or urceolate with narrow mouth and short spreading lobes. Stamens 6, adnate to the base of the perianth, all perfect or 3 reduced to staminodes, or only 3 and no staminodes; filaments incurved or recurved; anthers small, 2-celled, globose, oblong or didymous, or the cells discrete on branches of the filament. Pistillode various or 0. Female flowers : Perianth usually smaller than in the male, 6-fid or 6-partite, persistent. Staminodes 3 or 6 or 0. Ovary inferior, 3-quetrous, 3-celled; ovules 2 in each cell, superposed, pendulous, anatropous or subamphitropous; styles 3, very short; stigmas entire or 2-fid, recurved. Fruit a berry or 3-valved capsule. Seeds flat or globose; albumen fleshy, rather hard; embryo minute, enclosed in the albumen.—Genera 9. Species 220.—Tropical and warm temperate.

The rhizome is amylaceous, acrid and bitter.

Many species contain a poisonous acrid juice.

A bitter poisonous alkaloid, dioscorine, has been obtained from the tubers of *Dioscorea hirsuta* Blume.

DIOSCOREA Linn.

Herbs with slender twining (rarely procumbent) stems. Leaves alternate or sometimes opposite, entire or lobed, or digitately 3-9-foliolate. Flowers 1-sexual, usually dioecious. Male flowers : Perianth campanulate, rotate, or urceolate; lobes short, spreading. Stamens 6 perfect, or 3 alternating with 3 staminodes, or 3 without staminodes; anthers small, the cells contiguous or discrete. Pistillode thick, fleshy or 0. Female flowers : Perianth-segments 6, free, small. Staminodes 6 or 3 or 0. Ovary inferior, 3-quetrous, 3-celled; ovules 2 in each cell, superposed, laterally attached near the apex; styles 3, short; stgmas terminal, entire or 2-fid, reflexed above the style. Fruit a loculicidal capsule, laterally flattened, almost winged. Seeds compressed, often with a large membranous wing; albumen compressed, fleshy or hard, 2-laminate; embryo between the laminæ with a suborbicular cotyledon.—Species 200.—Tropical and subtropical.

1.	Leaves 3-foliolate, long-petioled	4.	*D. triphylla.*
2.	Leaves 3-5-foliolate, glabrous or sparsely pubescent beneath ..	1.	*D. pentaphylla.*
3.	Leaves mostly opposite, from lanceolate to elliptic-oblong, ovate or orbicular	2.	*D. oppositifolia.*
4.	Leaves opposite and alternate, usually very deeply cordate but sometimes with only a shallow broad sinus	3.	*D. bulbifera.*
5.	Leaves subhastately or deeply cordate, orbicular or ovate, 3-7-nerved	5.	*D. alata.*

The tuber is antispasmodic, diaphoretic, expectorant, cardiotonic, and detergent.

The following species are used medicinally in China—*D. japonica* Thunb., *D. sativa* Linn., *D. tokoro* Mak.—; in the Gold Coast—*D. dumetorum* Pax.—; in Guinea—*D. bulbifera* Linn.—; in Southern Africa—*D. dregeana* Bkr., *D. dumetorum* Pax., *D. sylvatica* Kunth—; in North America—*D. villosa* Linn.—; in Brazil—*D. dodecaneura* Vell., *D. piperifolia* Willd., *D. sativa* Linn.—.

The bitter and poisonous alkaloid, dioscorine, was obtained from the tubers of *D. hirsuta* Blume.

1. **Dioscorea pentaphylla** Linn. Sp. Pl. (1753) 1032.—PLATE 960.

Root-tubers oblong, very long, 1.5-1.8 m.; stem slender, twining, glabrous, prickly towards the base, often bulbiferous in the leaf-axils. Leaves alternate, 3-5- (rarely 7-) foliolate, glabrous or sparsely pubescent beneath; common petiole 2.5-6.3 cm. long; leaflets variable in size and shape, 5-12.5 by 2.5-5 cm., elliptic-lanceolate, ovate or obovate, acuminate, cuspidate or subcaudate, base usually acute; lateral leaflets oblique at the base; petiolules very short. Male flowers pale greenish, fragrant, in very slender shortly pedunculate racemes 2.5-3.8 cm. long, which are solitary or in fascicles along the hairy branches of a panicle 15-30 cm. long; bracts 2.5 mm. long and as broad as long, membranous, often mottled with brown, broadly ovate or almost semicircular, with a long slender acumen, glabrous. Perianth nearly 3 mm. across when spread out; segments often mottled with brown, ovate, subacute, sparsely pubescent, subequal; pedicels very short. Stamens 3 perfect; anthers subsessile; staminodes 3, minute. Pistilode 3-lobed. Female flowers in axillary pendulous pubescent spikes 5-15 cm. long. Capsules quadrately oblong, 2-2.5 cm. long, usually retuse at both ends, nearly glabrous or more or less pubescent, often apiculate. Seeds 1.3-2 cm. long (including the wing at the base); wing longer and broader than the oblique nucleus, thinly membranous.

Distribution: Throughout India, Ceylon.—Malay Hills, tropical Africa.

The tubers are sometimes used to disperse swellings.

Also used as a tonic.

Akola: Mohankand, Mohanakand—; *Akyab:* Taw Kadat—; *Ali Rajpur:* Kikare, Kinkari—; *Almora:* Bantarur, Ghajir, Ghanjir—; *Amboina:* Ahei, Ahey, Aywel, Ywel—; *Andamans:* Charodi—*Angul:* Suta alu—; *Arrah:* Khanewa, Khaneya, Khaniakand—; *Baghelkand:* Khanewa, Khaneya, Khaniakand, Nakoe, Nakua, Nakwa, Padri—; *Balaghat:* Chunchunikand—; *Balasore:* Bayanalu, Cholasanga, Odorah alu, Ribe alu—; *Bali Islands:* Samoan, Samowan, Samwan, Waccat, Wakat—; *Balrampur:* Khanti—; *Bundelkhand:* Bhaserakand—; *Behari:* Tena Teona, Teoni—; *Belgaum:* Ankul—; *Bengal:* Suar alu, Suareh alu, Suaria alu, Sur alu—; *Betul:* Banrat alu, Belnikand—; *Bhandara:* Dakurkand, Dukarkand, Dukelkand, Sherkand, Sherkandi—; *Bhutan:* Towo—; *Bilaspur:* Surendikand—; *Bina:* Kaeo, Kao—; *Bombay:* Kantaalu, Londi, Lundi, Shendorwel, Ulsi—; *Brahmaputra Valley:* Barmuria—; *Burma:* Hputsa, Hputsau, Phosao, Pwasao—; *Buron:* Lae, Lahi, Lua—; *Cachari:* Tamiṣi, Tamshi—; *Calcutta:* Chamar alu, Kukur alu, Patha alu, Suker alu—; *Celebes:* Abubo, Kabubo, Kasuvo, Lame aju, Ubi mangindano—; *Central Provinces:* Badakanda, Barakanda, Barahikanda, Baraikanda—; *Ceylon:* Allai, Gonalla, Katawalla, Katuwella—; *Chanda:* Punda mohra gudda—; *Chin:* Hra hnim, Pen hru—; *Chota Nagpur:* Dura alu, Durisanga, Dursanga, Nakoe, Nakua, Nakwa—; *Circars:* Kondagummadu, Mullupendalam—; *Cuddapah:* Adivigenusugadda, Yellagaddalu—; *Damoh:* Pedrakanda—; *Darjeeling:* Sinthi—; *Darrang:* Edalu, Mua jhapra alu—; *Dehra Dun:* Bantarur, Debbar—; *English:* Kawan Yam, Fiji Yam—; *Fiji:* Bulo, Kailetokatolu, Tokatolu—; *Ganjam:* Mayyakupendalam—; *Gaya:* Khanewa, Khaneya, Khaniakand—; *Godaveri:* Vaipadumpa—; *Gonda:* Khanti, Padimuskir—; *Gorakhpur:* Tiwan—; *Hanuabada:* Bakuta, Lebeta, Maloa—; *Hazaribagh:* Hasersanga—; *Himalaya:* Teguna—; *Hindi:* Bhusa, Bursa, Gajaria, Kanta alu, Phal alu, Tena, Teona, Teoni—; *Hitua Island:* Pete—; *Hoshangabad:* Bajrakand—; *Igorrote:* Kasi—; *Java:* Katak, Ubi chabuk, Ubi pasir, Ubi sabut, Ubi sawut, Uwi paturi—; *Jhansi:* Gajar, Gajaria, Surka—; *Jubbulpore:* Lowar, Lurga, Sumri—; *Kachin:* Nai chu nai, Nai n'byen, Nai n'pyen—; *Khasia:* Phankursiu, Phankyrsiu somthiah, Phan sujab—; *Kolami:* Boiang, Boiom, Byam, Byangsanga, Itulad sanga—; *Korku:* Gobadu—; *Kumaon:* Maginamuniya, Taguna, Takuli—; *Lepcha:* Kassok, Kassok ding, Kassok tuk zhok, Sulibok—; *Lochon:* Tae—; *Luhon:* Lae, Lahi, Lua—; *Madras:* Kurudugaddi, Senalikilhangu, Thanakacha—; *Madura Island:* Rabet, Rabet abubu, Rabet bangkat, Rabet elos, Rabet pangkat—; *Malabar:* Chaval, Chavalakilangu, Chavalli, Koranigenasu, Nutagenasu—; *Malay:* Abau, Abobo, Abubo, Abubu, Ahoea, Ahua, Ahuhu, Ohuhu, Ubi chiabet, Ubi tahun tahun, Ubi taun taun, Ubi utan—; *Malayalam:* Kattunurunnakilannu, Nuraigenassu, Nuraikaju, Nurankilangu, Nurkavan, Nurunnakilannu—; *Malda:* Tepta alu—; *Marathi:* Chataveli, Manda, Ulasi—; *Melghat:* Sukdibabra—; *Midnapur:* Charka alu, Sirka alu—; *Mikir:* Ruihang, Ruipeng, Ruiping—; *Minahassa:* Kapusayor—; *Mirzapore:* Nakoe, Nakua, Nakwa—; *Monghyr:* Bandoreh alu, Bandri alu, Khanewa, Khaneya, Khaniakand—; *Mundari:* Baeangsangga, Hasersangga, Huringaru, Ituladsangga, Jatangsangga—; *Murshidabad:* Boiang, Boiom, Byam, Byangsanga, Gangajali alu—; *Myaungmya:* Belat myouk u—; *Mymensingh:* Mocha alu—; *Naini Tal:* Bantarur, Ghajir, Ghanjir—; *New Caledonia:* Paa—; *Nilgiri Hills:* Nuraikaju—; *North Arcot:* Adivi genesu alla—; *North-West Himalayas:* Gajir, Ganjir—; *North-West Provinces:* Kanta alu—; *Orissa:* Karaba, Karba, Korba—; *Paharia:* Begur—; *Palamau:* Khanewa, Khaneya, Khaniakand—; *Pete:* Hituu—; *Philippines:* Bayangcan—; *Ranchi:* Jahreng—; *Sakai:* Jabbet, Ubi jabbet, Ubi pasir—; *Salem:* Kattuvallikkilangu—; *Samoa:* Pilita—; *Sanskrit:* Kantakalu—; *Santali:* Boiang, Boiom, Byam, Byangsanga—; *Santal Pargannahs:* Dura alu, Durisanga, Dursanga—; *Saugor:* Saevakand, Sairakand, Suorkand—; *Savara:* Adabgai—; *Shahabad:* Hathiakand, Khanewa, Khaneya, Khaniakand—; *Shan:* Man hing—; *Sibsagar:* Guti alu—; *Sikkim:* Kussok, Ranibegur—; *Singbhum:* Hasersanga—; *Sinhalese:* Katuwala—; *Solor:* Abau—; *South Kanara:* Gokaru—; *Suket:* Draigarh—; *Sumba Island:* Lua—; *Sundanese:* Huwi buah, Huwi chekkar, Huwi jahe, Huwi mantri, Huwi sawat, Huwi sawut, Huwi sawut jahe—; *Sylhet:* Menjiri—; *Tagalog:* Kayos, Limalima—; *Tahiti:* Paanara, Panara, Paraara, Patara, Ufi patara—; *Tamil:*

Kattukkilangu, Kattuvalli, Nurangilangu, Vallikodi—; *Telugu:* Karuchemba, Nuludumpa, Mullupendalamu, Pandigada, Pandimukkudumpa—; *Ternate:* Abobu, Abubu, Kabuvo, Kasuvo—; *Thana:* Chai, Chain, Chainkand, Chani, Chatai, Chatankand, Chayen, Kushi, Ulshi—; *Travancore:* Chaval, Chavalakilhangu, Chavalli, Kedoni, Kornapidan, Marakeshango, Murom Kacchel, Mullukilangu—; *Trichinopoly:* Kattuvallikkilangu, Malaikilangu—; *Tutuila Island:* Lega—; *Uriya:* Konta alu—; *Visayan:* Bayangkan, Sapang—; *Vizagapatam:* Addar, Dukkapendalam, Pandimukhatega, Tevatega, Tippatega, Tivatega, Tuma—; *Warangal:* Chunchugudda—; *Yera:* Kornmu—.

2. **Dioscorea oppositifolia** Linn. Sp. Pl. (1753) 1033; Wight Ic. t. 813.—Plate 961.

A large climber; rootstock short, with many long cylindric roots as thick as a swan's quill; stem slender, unarmed; branches terete, not bulbiferous, glabrous or pubescent. Leaves coriaceous, opposite or subopposite (rarely alternate), simple, 5-12.5 by 2.5-7.5 cm., polymorphous, from lanceolate to elliptic-oblong, ovate or suborbicular, acuminate or rounded, with well-defined cartilaginous margins usually glabrous, base rounded, with 3-5 strong nerves; petioles 0.6-3.2 cm. long. Male flowers in dense shortly pedunculate spikes 1-3.2 cm. long which are fascicled in the leaf-axils or along a slender axillary rhachis 10-25 cm. long; bracts below the spikes 3 mm. long, lanceolate-subulate; bracts below the flowers 1.2 mm. long, ovate, acuminate, membranous, mottled with brown. Perianth sessile with a broad base; outer lobes 2 by 1.6 mm., broadly ovate or suborbicular, concave, obtuse, mottled with brown; inner lobes smaller, somewhat ovate, mottled with brown. Stamens 6, perfect; anthers didymous; pistillode obscure. Female flowers distant, in solitary or fasciculate axillary spikes 15-20 cm. long; bracts 1.2 mm. long, suborbicular, acuminate, and as well as the perianth-lobes mottled with brown. Capsules suborbicular or often broader than long, 2.5-3.8 cm. diam., truncate, retuse or almost 2-lobed at the apex, coriaceous, glabrous, base cuneate. Seeds orbicular, 2-2.5 cm diam. with a large membranous wing all round the nucleus.

Distribution: E. and W. coasts of S. India, Ceylon, Assam.

The root, ground and heated, is applied to reduce swellings; it is also used in snake-bite and scorpion-sting.

The root is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Akola: Nagwelikand, Sutiakand—; *Ali Rajpur:* Jagalia alu, Kikare, Kinkari—; *Amraoti:* Anda, Andi, Andikand, Bolarkand, Dardi, Dardikanda—; *Angul:* Pani alu, Suta alu—; *Balaghat:* Kircha, Kirchikand, Rabi, Ravikand—; *Balasore:* Pani alu, Panpatica—; *Belgaum:* Lokheri, Persa, Pirsi—; *Betul:* Belnikand, Bhumiamati, Krishnamati—; *Bhandara:* Murkanda, Nanamati, Nandmati, Nanmati—; *Bilaspur:* Rabi, Ravikand—; *Bombay:* Lokheri, Marapasapoli, Marpaspoli—; *Buldana:* Kozikan—; *Canarese:* Inasara, Nirbatte, Tabinere—; *Ceylon:* Podhalivallikkilangu—; *Cuddapah:* Kurdagenasugodda,, Yellagadda—; *Cuttack:* Nirenja, Pani alu, Tamalia—; *Gond:* Girskonda, Sutkonda—; *Hoshangabad:* Krishnamati, Nanamati, Nandmati, Nanmati, Seemkwati—; *Hyderabad:* Yellagadda—; *Kallimalai Hills:* Velliala-vallikkilangu—; *Khandesh:* Oria—; *Korku:* Bail, Baiili, Bayal, Beliya, Bolar—; *Kurnul:* Yellagadda—; *Madras:* Mahaparuvallikkodi—; *Mandla:* Kircha, Kirchikand—; *Mangalore:* Kurudu—; *Melghat:* Wardi—; *Narsinghpur:* Nanamati, Nandmati, Nanmati—; *Nilgiri Hills:* Thavaikkachchu, Thavaikkaju—; *Nimar:* Anda, Andi, Andikand, Nagalkanda, Nagwelikand—; *Poona:* Hibagye—; *Raipur:* Kudaikand, Pithkanda, Pitkanda—; *Salem:* Karunaivallikkilangu, Kattuvallikkilangu, Nulikilangu, Vettilaivallikkilangu—; *Santal:* Piska—; *Saugor:* Kircha, Kirchikand, Mithakand, Nanamati, Nandmati, Nanmati—; *Savara:* Gadigai, Ganuga—; *Sika:* Hura—; *Sinhalese:* Hiritala—; *South East Borneo:* Owibawoi—; *Tamil:* Vettilaivalli—; *Telugu:* Adavidumpatige, Adaviyatagatige, Aretegalu, Aretige, Atyaga, Avatengatige, Chenchudumpa—; *Travancore:* Kanji, Kavallikacchel, Panukelathunkacchil, Pariyakanni—; *Trichinopoly:* Kattuvallikkilangu—; *Uriya:* Gourobi,. Pittale—; *Vizagapatam:* Aritega, Avitega, Avitengatega—.

3. **Dioscorea bulbifera** Linn. Sp. Pl. (1753) 1035; Wight Ic.

t. 878.—*D. sativa* Thunb.; Hook. f. Fl. Brit. Ind. VI (1892) 295.—PLATE 962 (under D. sativa), PLATE 963.

Tubers variable. Bulbils numerous, irregular in shape, 2.5 cm. or more across, brown, warted. Stem twining to the left. Leaves usually alternate, about 10-15 by 7.5-10 cm., often much larger or smaller, ovate, acuminate, base more or less deeply cordate, lobes rounded, 7-11-nerved. Male spikes 5-10 cm. long, clustered, axillary or in leafless panicles. Stamens 6. Female spikes 10-25 cm. long, in axillary clusters of 2-5. Capsule 1.8-2.2 cm. long, oblong. Seeds winged at the base.

Distribution: India, Ceylon, Malay Peninsula.—Australia, New Caledonia, Madagascar, E. Africa, Brazil.

The tuber is bitter, pungent; fattening, tonic, alterative, aphrodisiac, stomachic, anthelmintic; improves appetite and complexion; useful in dyspepsia, urinary discharges, leucoderma, bronchitis, " vata ", biliousness, piles, tumours, strangury (Ayurveda).

The tuber has a sharp bitter taste; expectorant, astringent to the bowels; useful in asthma, bronchitis, pain in the abdomen (Yunani).

The tubers are applied to ulcers after being dried and powdered. In the plains of the Punjab, the leaves are used medicinally and sold under the name of *tatar puttr*.

In Guinea, the skin and the juice of this yam are used as vesicatories.

Akola: Chedarikand—; *Akyab:* Man ye in du—; *Amboina:* Heriputi, Ubi bontal—; *Amraoti:* Babrakand, Gogdu—; *Anamalai Hills:* Pannukilangu, Shavalkelangu—; *Andamans:* Khalait—; *Assam:* Kathalu, Mati alu, Patni alu—; *Bagobo:* Dadakan—; *Balaghat:* Kauhaia Kand, Kauhia Kand, Matawar Kand—; *Balasore:* Baula alu—; *Bali:* Ubi ipit—; *Bankura:* Banbabla, Pahariaphalalu—; *Batavia:* Uwi Kłapa—; *Behari:* Gita, Githa—; *Bengal:* Banalu, Bandorechalu, Bandrialu, Chamalu, Chuvodialu, Suaralu, Suarehalu, Suaria alu, Suralu—; *Berar:* Chenagaddi—; *Betul:* Dukurkand, Gari, Ghari alu—; *Bicol:* Pologan, Pugang, Pulugan—; *Bihari:* Genth, Genthi, Gethi—; *Bilaspur:* Gitorakanda—; *Birbhum:* Bamla, Bamli, Bawla—; *Bogra:* Bathraj, Buna alu—; *Bombay:* Hadukaranda, Karanda, Karinda—; *Buldana:* Gogdu—; *Burma:* Kadu u—; *Buru Island:* Mandengen boti—; *Calcutta:* Kukuralu, Sukeralu—; *Celebes:* Abubo, Ubi ondo, Ubi putih—; *Central Celebes:* Ohu, Ohuhu—; *Central Provinces:* Matalu, Mataru, Matarukanda, Matharu—; *Ceylon:* Katuwalla, Katuwella, Uda alla, Udella—; *Chanda:* Kurukanda, Nullagodda—; *Chin:* Hra tow, Pangil—; *Chindwara:* Keaikanda—; *Chinese:* T'u Uh, Un Kau Tou—; *Chittagong:* Amadalata, Bhasalu, Pagla alu, Raht alu—; *Chota Nagpur:* Anathikand—; *Circars:* Malakayapendalam, Malaykayapendalam, Putidumpa, Putisara, Radrakshapendalam—; *Cuttack:* Garaba—; *Dacca:* Gachua alu, Gaicha alu—; *Damoh:* Bihikand—; *Deccan:* Kaukarinda, Kurukarinda—; *Dinajpur:* Buna alu, Jangli alu—; *English:* Bulb bearing Yam—; *Fiji:* Kaile—; *Flores:* Ohu, Ohuhu—; *Formosa:* Sim Shu—; *Friendly Islands:* Hoi—; *Fulah:* Puribale—; *Ganjam:* Kayapendalam, Nullaginnigeddalu—; *Gond:* Karulmati—; *Gujerati:* Salvinavelya, Suariya, Varahikanda—; *Halmaheira:* Ubi da are—; *Hawaiian Islands:* Hoi—; *Hindi:* Bhirvolikanda, Genth, Genthi, Gethi, Karawakand, Karukanda, Zaminkand—; *Honam Islands:* Ka lau—; *Hoshangabad:* Chai, Chain, Chainkand, Chani, Chatai, Chatankand, Chayen, Gari, Ghari alu, Nanamati, Nandmati, Nanmati—; *Ilocano:* Aribukbuk—; *Jalpaiguri:* Jangli alu—; *Japan:* Benkei imo, Kashiu dokoro, Kashiu imo, Kei, Ke imo, Maruba dokoro, Maru dokoro, Nari imo, Niga gashiu, Sepp, Seppy, Zembu—; *Java:* Gembolo, Jebubug basu, Jebubug endog, Katak, Ubi blichik, Ubi buah, Ubi jububug, Ubi upas, Uwi upas—; *Jhansi:* Badakanda, Barakanda, Barahikanda, Baraikanda, Kandmul, Kanuwa, Khanuwa, Khinuwa, Ribsonikand—; *Kanara:* Kuntigenasu—; *Katha:* Tamalo—; *Khandesh:* Kand, Kanda, Karanda, Karandas, Karandi, Karanza, Karinda—; *Khasia:* Phan Kthang, Phan Kyrsiu, Phan lakhar, Phan lyngkhi, Phan pylleng, Phan solak Kthang—; *Kibbi:* Akammoto—; *Konkani:* Karando—; *Korku:* Bail, Baiili, Bayal, Beliya, Bolar, Bolarkand—; *Kotah:* Chai, Chain, Chainkand, Chani, Chatai, Chatankand, Chayen—; *Laos:* Hua pao—; *La Reunion:* Hoffe blanche, Pomme en l'air—; *Lepcha:* Kacheo, Kaching Katching, Katching Kacheo, Katching simbha, Katching simpat, Simbha, Singul bok—; *Luzon:* Bayagcabayo—; *Madiun:* Katak bledek—; *Madras:* Panjikurudu—; *Madura Island:* Kaburan, Kambubu, Rabet, Rabet abua, Rabet soseyan, Rabet sosyan—; *Malabar:* Kalgenasu, Thulikacchal, Vennikilangu—; *Malacca:* Akarkumili, Ubi Kumili utan—; *Malay:* Abau, Abobo, Abubo, Abubu, Ahoea, Ahua, Ahuhu, Akar Kumili hutan, Ohuhu, Ubi china, Ubi kistale, Ubi Kulo, Ubi putih—; *Malayalam:* Kattukachil—; *Malinke:* Danda—; *Manbhum:* Bargonari—; *Mandla:* Gitorakanda—; *Marathi:* Dukarakanda, Gathalu—; *Mauritius:* Cambare marron—; *Midnapur:* Bamla, Bamli, Bawla—; *Monghyr:* Anathikand—; *Mount Abu:* Loli—; *Mundari:* Baradbonari, Joaru, Josangga—; *Mymensingh:* Gachua alu, Gaicha alu, Jangli alu, Paicha alu—; *Naga:* Tsu pre pyadzu—; *Narsinghpur:* Gathour Kand—; *Nasik:* Karandakand, Kurukand—; *Negri Sembilan:* Akarkumili—; *Negros:* Banagan—; *Nepal:* Kukur torul—; *New Caledonia:* Desmonan, Shoa—; *New Guinea:* Kau—; *Ngarengan:* Katak gulug—; *Nimar:* Kalakand—; *North Celebes:* Owi Kulo—; *North Kanara:* Heggenasu—; *North-West Himalayas:* Bangethi, Ghargenthi, Ghargethi, Ghargita, Karwigenthi, Karwigethi, Mithigenthi, Mithigethi, Titigethi—; *Nussa Laut:* Huelyo puil—; *Paharia:* Genth, Genthi, Gethi—; *Pakokku Chin Hills:* Khalet u—; *Persian:* Zaminekanda—; *Poona:* Karanda—; *Preanger:* Gadung bodas—; *Punjab:* Zaminkhand—; *Queenstand:* Anyorbil, Daiperi, Kalkur, Karroo, Kunjanga, Kurijanga, Unwoo, Wika, Wokai—; *Raipur:* Bihikand, Botlakanda, Dangkanda, Pithkanda, Pitkanda, Sharbutrakanda—; *Ranchi:* Haradbhu—; *Sadani:* Giti—; *Sanskrit:* Amrita, Badarakachha, Balya, Bilvamula, Brahmaputri, Brahmikanda, Charmakaraluka, Ghrishti, Kanya, Kaumari, Krodakanya, Krodi, Kushthanashaka, Madhaveshtagrishtika, Magadhi, Mahaushadha, Mahavirya, Shambarakanda, Shukari, Sukandaka, Trinetra, Vanamalini, Vanavasi, Varahi, Varahikanda, Vishvaksenapriya, Vridhida, Vyadhihanta—; *Santali:* Pisika, Piska—; *Sapania Island:* Huelyo putih—; *Saugor:* Gari, Ghari alu—; *Savara:* Butigai—; *Savu Island:* Hiwu, Huwi wara—; *Shahabad:* Hathiakand—; *Shan:* Ho Kho, Mak hko hton—; *Shortlands Island:* Alapa—; *Sikkim:* Ghitatorul, Kunchong—; *Singapore:* Ubi Kastela—; *Singbhum:* Pitasi—; *Sinhalese:* Panukondol—; *Solar:* Abau—; *Soussou:* Dane—; *South*

Borneo: Owi behas—; *South Ceram:* Elan putih, Maelan putih, Ohu, Ohuhu—; *South Ceylon:* Panukondal—; *Sundanese:* Huwi upas—; *Suket:* Khitta—; *Surat:* Kedrokand, Manokand—; *Tagalog:* Ubi ubihan, Utongutongan—; *Tahiti:* Hoi, Ufi hoi—; *Tamil:* Kattukkilangu—; *Tanjore:* Attukavalai, Koppakavalli, Malaikilangu, Satikkavalli—; *Telugu:* Chedupaddudumpa, Malakakayapendalamu—; *Ternate:* Abobu, Abubu—; *Tongking:* Day su van—; *Travancore:* Andutkacchel, Mukakacchel, Mukakeshango, Pattikacchal, Thulikacchal, Varakilangu—; *Twi:* Akam—; *Uliassers:* Heriputi—; *Urdu:* Zaminekand—; *Uriya:* Pita alu—; *Visayan:* Banagan, Baong, Bayangcan, Bohayan, Pologan, Pugang, Pulugan—; *Vizagapatam:* Adivikondadumpalu, Chedudumpa, Cheduhaddudumpa, Kayapendalam, Putidumpa, Putisara, Sisidumpa—; *West Coast:* Gorakarandas, Kadukarandas—.

4. **Dioscorea triphylla** L. Amoen. Acad. IV (1754) 131.—*D. daemona* Roxb. Fl. Ind. III (1832) 805; Wight. Ic. t. 811.

Root tuberous, lobed, biennial; stems twining, more or less prickly. Leaves 3-foliolate; common petiole 10-20 cm. long, usually prickly; leaflets 10-20 by 5-12.5 cm., all petiolate, broadly cuneate-obovate, cuspidately caudate-acuminate, villous when young, glabrous in age, sometimes reticulately veined, base tapering, 3-5-nerved; lateral leaflets very oblique; petiolules 3-16 mm. long. Male flowers in dense cylindric pedunculate spikes 6-8 mm. long, arranged in clusters along the more or less prickly, pubescent or villous rhachis of a raceme 15-45 cm. long; peduncles of spikes 1.2-6 mm. long, pubescent; bracts broadly ovate deltoid at the apex, pubescent, shorter than the flowers. Perianth nearly 3 mm. across; lobes broadly oblong or suborbicular, usually rounded, the 3 outer membranous, shorter than the inner, the 3 inner coriaceous or somewhat fleshy, with incurved tips, longer than the outer. Stamens 6, all antheriferous; anthers subsessile. Pistillode very low, broad. Female flowers: Spikes solitary, distant. Capsules 5 by 2.5 cm., quadrately oblong, truncately rounded at the ends, smooth and polished; pedicels very short. Seeds 3.2 cm. long (including the wing); wing 2.2 by 1.3 cm., at the base of the seed, membranous, oblong, obtuse, broader than the flat oblique nucleus.

Distribution: Throughout India.—Malay, Tonkin.

The tubers are well known by Malays to possess narcotic properties and to cause vomiting.

The juice of the tuber, obtained by boiling, is used with that of the Upas Tree in Java for making arrow-poison.

Malay: Gadong, Ubi akar—; *Saora:* Kolli—; *Telugu:* Pedumpa Punidumpa, Tandrabisalatige—.

5. **Dioscorea alata** Linn. Sp. Pl. (1753) 1033 var. **globosa** Prain Beng. Pl. 1065.—*Dioscorea globosa* Roxb. Fl. Ind. III (1832) 797.

Quite glabrous; tubers roundish or oblong, white inside; stem acutely angled or winged. Leaves mostly opposite 7.5-18 by 3.8-12.5 cm., broadly ovate, cuspidately acuminate, subhastately or deeply cordate and 7-9-nerved at the base; petioles 5-12.5 cm. long. Capsules 2.5 by 3.8 cm., broader than long, of 2 semicircular flat lobes, retuse at the apex, cuneate at the base. Seeds with a wing all round. Cultivated commonly.

Distribution: Only known in cultivation.

The tuber is anthelmintic; useful in leprosy, piles, and gonorrhœa.

Bengal: Chupri alu—; *Bombay:* Chaina, Chopri alu, Khaunphal, Myoukphal, Safed kauphal—; *English:* Common Yam, Humped Yam—; *Hindi:* Chupri alu—; *Sanskrit:* Pindalu—; *Santali:* Bengonari—; *Tamil:* Kayavalli—; *Telugu:* Gunapendalamu—; *Uriya:* Jhonka alu—.

LILIACEAE.

Herbs (very rarely shrubs or small trees) with fibrous roots, or a creeping rootstock, or a bulb or corm. Leaves various. Flowers usually hermaphrodite, axillary or terminal, solitary, or twin, or umbellate, spicate, racemose, paniculate, or fasciculate; bracts usually small, scarious, sometimes, when the flowers are umbellate, spathe-like. Perianth herbaceous or petaloid, usually 6-merous in 2 series, imbricate (rarely valvate) in bud. Stamens 6 (rarely 3 or fewer), hypogynous or adnate to the perianth; filaments free or connate; anthers oblong or linear, often dorsifixed, usually dehiscing longitudinally. Ovary 3-celled; ovules 2 or more from the inner angles of the cells, anatropous (rarely orthotropous); style usually simple, often long (rarely short or 0), or styles 3. Fruit a capsule or berry, usually 3- (rarely 1-) celled. Seeds 1 or more, globose or flattened; albumen horny or fleshy; embryo small, terete.—Genera 250. Species 2,700.—Cosmopolitan.

1. Shrubs. Stem climbing. Leaves 3-5-nerved. Petiole often cirrhiferous. Perianth 6-partite .... SMILAX.
2. Stem erect or climbing. Leaves replaced by usually linear or acicular cladodes. Flowers small, solitary, fascicled or racemed ASPARAGUS.
3. Stem herbaceous, unbranched, leafy. Flowers axillary or in terminal racemes or panicles .... POLYGONATUM.
4. Rootstock short or a bulb. Flowers racemed. Perianth-segments distinct ....
    a. Flowers racemed. Ovarian cells 2-ovuled. Capsule 3-angled ASPHODELUS.
    b. Flowers racemed. Ovarian cells 4-6-ovuled. Capsule 3-winged CHLOROPHYTUM.
5. Rootstock in the Indian genus a bulb. Scape simple. Flowers umbellate or capitate, at first enclosed in a spathaceous involucre. Strong scented herbs. Perianth rotate .... ALLIUM.
6. Rootstock a bulb. Scape simple, naked. Flowers racemose, not involucrate
    a. Perianth campanulate, 6-partite. Ovules many. Seeds flattened .... URGINEA.
    b. Perianth 6-partite. Seeds subglobose .... SCILLA.
7. Rootstock a bulb. Stem erect with 1 or more leaves. Flowers few, large, solitary or racemed
    a. Flowers large, nodding or pendulous. Anthers versatile .. LILIUM.
    b. Flowers large, nodding or pendulous. Anthers basifixed, erect .... FRITILLARIA.
8. Rootstock a tunicate corm. Leaves all radical. Scape very short, hypogaeous. Flowers 1-3. Perianth-tube very long, entire. Styles 3 .... COLCHICUM.
9. Rootstock tuberous or creeping. Stem leafy. Leaves not sheathing, cirrhose. Flowers axillary. Stem twining. Capsule loculicidal .... GLORIOSA.
10. Ovules many in each cell. Leaves usually thick and spinose
    a. Flowers large. Sepals nearly free. Anthers small on a thick filament. Fruit capsular or baccate .... YUCCA.
    b. Sepals connate or conniving nearly to tip. Leaves spinous .... ALOE.

Nutrient, mucilaginous, acrid and narcotic, bitter and emetic, stimulant, diuretic, diaphoretic, and purgative.

Among the products isolated may be mentioned :—1. acids—gallic, maialic, malic—; 2. acid amides—asparagin—; 3. sulphur compounds—allylpropyldisulphide, diallyldisulphide—; 4. anthraquinone derivatives—aloe emodin—; 5. carbohydrates—mannans—; 6. glucosides—barbaloin, isobarbaloin, convallamarin, convallarin, glycyphyllin, nataloin, parillin, sarsasaponin, scillain, scillitin—; 7. alkaloids—cevadilline, cevadine, colchicine, imperialine, jervine, protoveratridine, protoveratrine, pseudojervine, rubijervine, sabadine, sabadinine, veratridine—.

Allium porrum Linn. is said to contain arsenic.

OFFICIAL:—Aloin (Great Britain, Spain, United States).

Colchicine (France, Germany, Spain, Sweden, Turkey, United States).

Veratrine (Austria, Belgium, France, Germany, Holland, Hungary, Italy, Norway, Russia, Spain, Sweden, Switzerland, Turkey), —sulphate (Spain).

Allium Cepa Linn., *A. sativum* Linn., *A. Scorodoprasum* var. β Linn. (*A. ophioscorodon* Don.) in Portugal.

Aloe spp. (Austria, Belgium, Denmark, France, Germany, Great Britain, Hungary, Italy, Japan, Norway, Portugal, Spain, Sweden, Turkey); *A. africana* Mill (France, Italy, Norway); *A. arborescens* Will. (Spain); *A. ferox* Mill. (Belgium, Denmark, France, Germany, Italy, Russia, Spain, Sweden, Switzerland, Turkey, United States); *A. linguaeformis* DC. (France), —Linn. (Spain); *A. perfoliata* Linn. (France); *A. Perryi* Bak. (Italy, United States); *A. plicatilis* Miller (Italy); *A. spicata* Thunb. (France),—Thunb. (Spain); *A. succotrina* Lam. (Italy); *A. vera* Lin. (Holland, United States),—Will. (Spain); *A. vera* Linn.=*A. vulgaris* Lam. (France); *A. vera* Linn.=*A. vulgaris* Lam., *A. barbadensis* Miller (Italy); *A. vulgaris* Lam.=*A. vera* Linn. (Spain).

Asparagus officinalis Linn. (France)=*A. sativus* Bauh. (Portugal).

Asphodelus aestivus Brot. (*A. apiocarpus* Hoffmseg.), *A. ramosus* Linn. (*A. racemosus* Link) in Portugal.

Colchicum spp. (Italy); *C. autumnale* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United States); *C. neapolitanum* Teuore (Italy).

Convallaria majalis Linn. (Austria, Belgium, France, Italy, Russia, Spain, Switzerland).

Erythronium japonicum Makino (Japan).

Ruscus aculeatus Linn. (France, Portugal).

Sabadilla officinarum Brandt (Austria, Russia)=*Asagraea officinalis* Lindl. (Portugal).

Schoenocaulum officinale A. Gray (Belgium, Sweden)= *Asagraea officinalis* Lindley, *Sabadilla officinarum* Brandt (Italy), —Asa Gray (France, Norway),—Schlecht. (Holland),—(Schlechtendal) A. Gray (Switzerland),—(Schlechtendal) Asa Gray= *Sabadilla officinarum* Brandt (Russia),—(Schlechtendal & Chamisso) Asa Gray (Germany).

Scilla maritima Linn. in Hungary, Spain; *S. maritima* var. *radice alba* G. Bauh. (*Ornithogalum maritimum* Tournefort and Brot.) in Portugal.

Smilax sp. (Austria, Denmark, Switzerland); *Smilax spp.* (Holland, Hungary, Italy, Japan, Norway, Russia, Sweden, United States); *S. aspera* Linn. (Portugal); *S. China* Linn.=*S. ferox* Wallich. (Portugal); *S. medica* Cham. & Schlechdt (Belgium, United States), —Schlectendal (Portugal),—Schlecht. & Cham. (France, Italy); *S. officinalis* H. B. Kth (Belgium),—Kunth (Portugal, United States); *S. ornata* Hook. fil. (Belgium, United States),—Leman (Italy); *S. papyracea* Poir.=*S. syphilitica* Mart. non Thunb. (Portugal); *S. utilis* Hemsley (Germany, Turkey).

Urginea maritima Linn. (Russia),—Baker (Austria, Denmark, Japan, Norway, Sweden),—L. Baker (Hungary),—(Linne) Baker (Germany, Switzerland, Turkey, United States); *U. Scilla* Steinh. (Belgium, France, Great Britain, Holland, Italy, Portugal)= *U. maritima* Baker (Spain).

Veratrum album Linn. (Germany, Hungary, Russia, Sweden, Switzerland),—var. *albiflorum*=*V. album* Bernhardi and var. *viridiflorum*=*V. lobelianum* Bernhardi (Portugal); *V. Lobelianum*

Bernh. (Russia); *V. officinale* Schlecht. (France); *V. viride* Aiton (United States)=*Melanthium virens* Thunb. (Portugal).

Smilax Linn.

Climbing shrubs (rarely erect herbs). Leaves alternate (rarely opposite), persistent, 3-7-nerved, reticulately veined; petiole usually with 2 tendrils above its base. Flowers small, umbellate, dioecious. Perianth of 6 free, usually incurved or recurved, subequal segments. Male flowers: Stamens 6 or more, inserted at the base of the perianth; filaments erect, free, long or short; anthers oblong, 2-celled, didymous, with contiguous cells or with cells discrete by a forking of the connective. Pistillode 0. Female flowers: Staminodes 3 or 6, filiform. Ovary 3-celled, 3-gonous; ovules 1-2 in each cell, orthotropous, pendulous; style short or 0; stigmas 3, stout, recurved. Fruit a globose berry. Seeds solitary, or more often 2, hemispheric (rarely 3); albumen horny; embryo small.—Species 210.—Tropics and subtropics.

1. Buds globose. Sepals incurved in flower .... 1. *S. glabra.*
2. Leaves 10-15 cm. long, orbicular-oblong, or oblong-lanceolate, acuminate .... 2. *S. lanceaefolia.*
3. Leaves 12.5-18 cm., elliptic or broadly oblong, or ovate-oblong, cuspidate .... 3. *S. zeylanica.*
4. Leaves 4-8 from ovate acuminate to orbicular-ovate or oblong, cuspidate .... 4. *S. prolifera.*

Narcotic, diaphoretic, and emetic; antiherpetic, antisyphilitic, antiscorbutic, antirheumatic.

The following species are used medicinally in Europe—*S. aspera* Linn.—; in China and Japan—*S. china* Linn.—; in China and Indo China—*S. kraussiana* Meissn.—; in Australia—*S. glycyphylla* Smith.—; in North America—*S. pseudochina* Linn., *S. sarsaparilla* Linn.—; in Mexico—*S. medica* Cham. and Schlecht., *S. rotundifolia* Linn., *S. sarsaparilla* Linn.—; in Central America—*S. syphilitica* Willd.—; in Colombia—*S. salutaris* Kunth., *S. syphilitica* Willd.—; in Peru—*S. febrifuga* Kunth.—; in Brazil—*S. brasiliensis* Spreng., *S. fluminensis* Steud., *S. japicanga* Griseb., *S. papyracea* Duham., *S. sarsaparilla* Linn., *S. salutaris* Kunth., *S. syphilitica* Willd.—; in

Guiana—*S. papyracea* Duham—; in the West Indies—*S. ornata* Lem., *S. pseudochina* Linn., *S. salutaris* Kunth.—; in Southern Africa—*S. kraussiana* Meissn.—; in Madagascar *S. goudotiana* A. DC., *S. kraussiana* Meissn.—.

OFFICIAL:—The root of *Smilax sp.* (Austria, Denmark, Switzerland); *Smilax spp.* (Holland, Hungary, Italy, Japan, Norway, Russia, Sweden, United States); *S. aspera* Linn. (Portugal); *S. china* Linn.=*S. ferox* Wallich. (Portugal); *S. medica* Cham. & Schlechdt (Belgium, United States),—Schlectendal (Portugal),—Schlecht. & Cham. (France, Italy); *S. officinalis* H. B. Kth (Belgium),—Kunth (Portugal, United States); *S. ornata* Hook. fil. (Belgium, United States),—Leman (Italy); *S. papyracea* Poir.=*S. syphilitica* Mart. non Thunb. (Portugal); *S. utilis* Hemsley (Germany, Turkey).

1. **Smilax glabra** Roxb. Fl. Ind. III (1832) 792.—PLATE 964.

Branchlets slender, terete, smooth, unarmed. Leaves rather thin, 7.5-15 by 3.2-5.7 cm., elliptic- or ovate- lanceolate, acuminate, 3-costate to the rounded or cuneate base; petiole 13-17 mm., narrowly sheathing, unarmed, sheath 8-17 mm. long, axillary; cirrhi very slender. Umbels subsessile, many-flowered; peduncle ebracteate, pedicels 6-8 mm.; bracteoles subulate; flowers very small, white; buds depressed-globose, deeply 6-lobed from the groove on the back of the obovate cucullate coriaceous sepals; petals minute; stamens very short; staminodes in female flowers 3.

Distribution: Assam, Sylhet, Lower Khasia Hills, Tenasserim.—China.

A decoction of the fresh root is used by the hill tribes of Assam for the cure of sores and venereal complaints.

Bengal: Harinashukchina—; *Garo:* Hazina—; *Hindi:* Barichobchini—.

2. **Smilax lanceaefolia** Roxb. Fl. - Ind. III (1832) 792.—PLATE 965.

Branches slender, subterete; prickles few or 0. Leaves membranous, subcaudate, 10-15 by 3.8-7.5 cm., orbicular-oblong or oblong-lanceolate, acuminate, 3-costate, base acute, intramarginal nerves very slender, punctulate and lineolate; petiole 1.3-2 cm.

Sheath obscure. Male umbels subsessile, 15-25-flowered; peduncles naked, shorter than the petioles; pedicels 8 mm., filiform; bracteoles ovate, acute; flowers 6 mm. diam.; sepals and petals linear, subequal; anthers oblong, much shorter than the filaments. Female umbels subsimilar; peduncle stout, flattened; bracteoles very minute, subulate or 0; staminodes 3, ovary short, obtusely trigonous; stigmas short, obtuse, recurved. Berry about 6 mm. diam.

Distribution: Sikkim Himalaya, Assam, Burma.—China.

The juice of the fresh root is taken inwardly for the cure of rheumatic pains, and the refuse, after extracting the juice, applied to the affected parts.

Bengal: Guteashukchina—; *Hindi:* Hindichobchini—.

3. **Smilax zeylanica** Linn. Sp. Pl. 1029.—*S. macrophylla* Roxb. Hort. Beng. (1814) 72.—*S. ovalifolia* Roxb. Fl. Ind. III (1832) 794.—PLATE 966 (under *S. macrophylla* Roxb.).

A large climber; stems smooth, striate, armed with a few small distant prickles or almost unarmed. Leaves alternate. 7.5-20 by 3.8-11.5 cm. (much larger in some Kumaon and Rangoon specimens), broadly ovate, or suborbicular, acuminate or cuspidate, glabrous, polished and shining, base usually rounded; main nerves 5-7 (usually 5), with reticulate venation between; petioles 1.3-2.5 cm. long, stout, narrowly sheathing below the middle; tendrils very long and slender. Flowers in pedunculate many-flowered umbels; peduncles 1.3-2 cm. long; bracts below the peduncles ovate, acute 2.5-4 mm. long; pedicels of both male and female flowers arising from an aggregation of numerous minute bracts. Male flowers: Pedicels 3 mm. long. Perianth 6-8 mm. long; segments linear, obtuse, erect when young, afterwards reflexed, the 3 outer 2.5 mm. broad, the 3 inner half as broad. Stamens 6 mm. long. Female flowers: Perianth rather shorter than in the male, the segments reflexed, the 3 outer ovate-oblong, obtuse, 2 mm. broad, the 3 inner half as broad; pedicels 6-8 mm. long, slightly elongating in fruit. Stigmas 3, recurved. Berry perfectly spherical, of the size of a large pea, smooth, remaining green for a long time, becoming ultimately red when ripe; fruiting pedicels 1.6-2.5 cm. long.

Distribution: Throughout India.—Java.

In some parts of India, the roots are used as a substitute for sarsaparilla in the treatment of venereal disease. Among the Santals, they are applied for rheumatism and pains in the lower extremities. The inhabitants of Nepal give them in doses of three mashas, for the treatment of gonorrhœa and other discharges from mucous membranes.

The Mundas of Chota Nagpur use the root in bloodless dysentery.

Bengal: Kumarika—; *Burma:* Kuku—; *Hindi:* Chobchini, Jangliaushbah, Ramdatun—; *Malayalam:* Kaltamara, Karivilanti—; *Marathi:* Gholyel, Ghotvel, Guti, Gutwel—; *Mundari:* Pundimarangatikir—; *Nepal:* Chobchini, Chopchini—; *Santali:* Atkir—; *Sinhalese:* Hinkabarasa, Kabarasa, Mahakabarasa—; *Tamil:* Ayadi, Malaittamarai, Tirunamappalai—; *Telugu:* Kondadantena, Kondagarbhatige, Kondatamara, Kummarabaddu, Kushtaputamara, Sitapa—.

4. **Smilax prolifera** Roxb. Fl. Ind. III (1832) 795.

A stout prickly climber with stems up to 2.5 cm. diam., branches mostly terete, armed throughout. Leaves narrowly elliptic, ovate-oblong or more rarely broadly elliptic, attaining 20 by 15 cm., usually 12.5 by 6.3 cm. to 18 by 10 cm., sheaths with large incurved wings with auricles often amplexicaul at base, apex often auricled laterally compressed and forming a rounded keeled tip above the petiole, from the junction of which and the petiole arise the two long cirrhi. Umbels in axillary and terminal panicles 7.5-15 cm. long usually whorled 3-(1-4-) nate, slender proper peduncles about 2.5 cm. long, bracts at the nodes small acute up to 3 mm. long (in very compound panicles the main branches are supported by leaf-sheaths without petiole or blade).

Distribution: Tropical W. Himalaya, Kumaon. Nepal, Sylhet, Bengal, Bihar, Burma, Deccan Peninsula and Ceylon.

Among the Mundas of Chota Nagpur, the root ground with old molasses or with coagulated cow's milk, is mixed with water and drunk as a remedy against blood-mixed stools in dysentery and against 'aradaud', a urinary complaint, in which the urine is dark and reddish. Before taking the medicine in the morning, they generally drink water in which dried mahua flowers have been soaked during the night (Encyclopædia Mundarica).

Mundari: Aramarangatikir—; *Sinhalese:* Mahakabarasa—; *United Provinces:* Ramdataun—.

ASPARAGUS Linn.

Rootstock stout, creeping. Stem erect straggling or climbing, terete grooved or angled. Leaves minute scales, often spinescent, bearing in their axils tufts of needle-like or flattened branchlets (cladodes). Flowers small or minute, axillary, rarely unisexual, solitary fascicled or racemed, pendulous; pedicel jointed. Perianth campanulate, 6-partite. Stamen on the bases of the segments; anthers oblong. Ovary 3-gonous; style 1, stigmas 3; cells 2- or more- ovuled. Berry globose. Seeds 2-6; testa, black, brittle; embryo dorsal.—Species 120.—Old World.

1.	Tall, erect. Cladodes 2-5-nate	1.	*A. filicinus.*
2.	Stem scandent, woody. Cladodes 2-6-nate	2.	*A. racemosus.*
3.	Stem tall, stout, suberect. Cladodes 6-20-nate	3.	*A. adscendens.*
4.	Stem subscandent. Cladodes 2-6-nate, linear, flattened	4.	*A. gonocladus.*
5.	Stem erect, much-branched. Numerous clusters or subulate cladodes, about 1.25 cm. long	5.	*A. officinalis.*

Root diuretic and aperient.

The following species are used medicinally in Europe—*A. acutifolius* Linn., *A. officinalis* Linn.—; in China—*A. lucidus* Lindl., *A. schoberioides* Kunth.—; in Annam—*A. filicinus* Ham., *A. lucidus* Lindl.—; in La Reunion—*A. officinalis* Linn.—; in Madagascar—*A. vaginellatus* Bojer.—; in Southern Africa—*A. asiaticus* Linn., *A. burkei* Bkr., *A. capensis* Linn., *A. laricinus* Burch., *A. medeoloides* Thunb., *A. plumosus* Bkr., *A. scandens* Thunb., *A. stellatus* Bkr., *A. stipulaceus* Lam., *A. striatus* Thunb., *A. virgatus* Bkr.—.

OFFICIAL:—The root and rhizome of *A. officinalis* Linn. in France, *A. officinalis* Linn. (*A. sativus* Bauh.) in Portugal.

1. **Asparagus filicinus** Ham. in Don Prodr. 49.—PLATE 967B.

Stems flexuous, fistular, much-branched, smooth, unarmed; lower branches spreading, upper internodes short. Cladodes 2-5-nate.

2.5-6 mm., falcate, flat, acuminate, costate. Pedicels solitary or binate, 0 or 6-13 mm., jointed about the middle. Flowers polygamous. Perianth 2-2.5 mm., subcampanulate, stamens short, anthers minute. Berry 6-8 mm. diam.

Distribution: Temperate and tropical Himalaya, from Kashmir to Bhutan, Khasia Hills, Assam, Burma.—China.

The root is considered tonic and astringent. In Kanawar, a sprig of this is put in the hands of small-pox patients as a curative measure.

The root is considered vermifuge and taeniafuge in Annam. It is given in cholera and acts as a powerful diuretic. It is also used as a cure for rheumatism due to dampness.

Annam: Thien dong, Thien mon, Thien mon dong—; *Jaunsar:* Kaunta, Sharanoi—; *Kashmir:* Allipalli—; *Punjab:* Allipalli, Saunspaur, Satzarra, Sensarpal—; *Ravi:* Sanspaur—; *Sutlej:* Muslisafed, Satzarra, Senserpal, Sitawar—.

2. **Asparagus racemosus** Willd. Sp. Pl. II, 152; Wight Ic. t. 2056.—Plate 968.

A tall climbing undershrub with annual woody terete stems. Branchlets triquetrous. Spines 5-13 mm. long, recurved or rarely straight. Cladodes 1.3-2.5 cm. long, in tufts of 2-6, curved. Flowers white fragrant, in solitary or fascicled, simple or branched racemes 2.5-5 cm. long. Pedicels 5 mm. long, jointed in the middle. Perianth about 3 mm. long. Stamens as long as the perianth. Berry 5-6 mm. diam., red.

Distribution: Throughout tropical and subtropical India and Ceylon, up to 4,000 ft. in the Himalayas, from Kashmir eastwards.—Tropical Africa, Java and Australia.

The roots are bitter, sweet; oleaginous, cooling, indigestible; appetiser; alterative, stomachic, tonic, aphrodisiac, galactagogue, astringent to the bowels; useful in dysentery, tumours, inflammations, biliousness, diseases of the blood and the eye, throat complaints, tuberculosis, leprosy, epilepsy, night blindness (Ayurveda).

The root is slightly sweet; aphrodisiac, laxative, expectorant, galactagogue, tonic; useful in diseases of the kidney and the liver, scalding urine, gleet, gonorrhœa (Yunani).

The root of this plant is used medicinally as a refrigerant, demulcent, diuretic, aphrodisiac, antispasmodic, alterative, anti-diarrhœatic and anti-dysenteric. It is used chiefly as a demulcent in veterinary medicine.

A decoction of the tubers was administered as a stomachic tonic in atonic dyspepsia, but the action was found to be slow and the result not encouraging (Koman).

The root is useless in the antidotal treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Arabic: Shaqaqul—; *Assam:* Hatmuli—; *Bengal:* Satamuli, Satmuli, Shatamuli—; *Bombay:* Satavari, Shatavari—; *Burma:* Kanyomi—; *Canarese:* Aheruballi, Ashadhi, Halavumakkalaballi, Halavumakkalataui, Majjigegadde, Satamulike, Satavari, Siparimuli, Sipariberuballi—; *Deccan:* Shaqaqulemisri—; *Dehra Dun:* Satrawal—; *Gujerati:* Satavari, Shatavari—; *Hasada:* Tursulunggui—; *Hindi:* Bojhidan, Sadabori, Satawar, Satmuli, Shakakul—; *Jaunsar:* Sharanoi—; *Malayalam:* Chatavali, Satavali, Satavari, Shatavali—; *Marathi:* Asvel, Satavarimul, Shatavar, Shatmuli, Zatar—; *Mundari:* Huringatikir—; *Naguri:* Huringatikir—; *Nepal:* Satamuli—; *Persian:* Shaqaqul—; *Porebunder:* Gajvel, Oklakanto, Sarpanasuva—; *Punjab:* Bozandan, Bozidan, Bozidun, Satawar—; *Sanskrit:* Abhiru, Aheru, Ardhakantaka, Atmagupta, Bahumula, Bahusuta, Bhiru, Bhirupatri, Darakantika, Divya, Durmana, Dvipashatru, Dvipika, Dvipishatru, Indivari, Jata, Kanchanakarini, Karshni, Keshika, Laghuparnika, Madabhanjini, Madhura, Mahapurushadanta, Mahashita, Mula, Narayani, Pivari, Rangini, Rishagata, Rishyaprokta, Shatamuli, Shatapadi, Shatavari, Shatavhaya, Shatavirya, Shvetamuli, Sukshmapatra, Supatra, Supatrika, Svadurasa, Tailavalli, Vaishnavi, Vari, Vasudevapriyankari, Vishvasya, Vrishya—; *Sind:* Tilora—; *Sinhalese:* Hatavari—; *Tamil:* Kilavari, Migundavanam, Nirmittan, Nirvittan, Paniyinakku, Sadamulam, Sadaveli, Sadaveri, Sandavari, Sattavari, Sirumal, Tannirvittan, Tusuppu, Varivari—; *Telugu:* Challagadda, Ettavaludutige, Pichara, Pilli, Pillipichara, Pillitega, Pillityaga, Satanandudu, Satavari, Sitammajata—; *Tigrinia:* Altalt, Gastanesto—;

Tulu: Tandangi, Uduriburu—; *Urdu:* Satavara—; *Uriya:* Chhotaru, Mohajolo, Sotabori—.

3. **Asparagus adscendens** Roxb. Fl. Ind. II (1832) 153.—Plate 969.

A suberect prickly shrub, with white tuberous roots. Stems tall, stout, suberect, terete, smooth, white, much-branched, branchlets ascending, ashy white, grooved and angled, the angles minutely scabrid; spines 1.3-2 cm. long, stout, straight. Cladodes in dense tufts of 6-20, 1.3-5 cm. long, slender, filiform, terete, soft, suberect or curved. Racemes 2.5-5 cm. long, many-flowered; pedicels jointed above or below the middle; bracts minute. Flowers 2.5 cm. diam. Perianth-segments spreading. Ovules many in each cell. Berry 6-8 mm. diam., 1-seeded.

Distribution: W. Himalaya and Punjab to Kumaon up to 5,300 ft.—Afghanistan.

The tuberous roots are used as demulcent and tonic; and they are said to be useful in diarrhœa, dysentery and general debility.

Bombay: Dholimusali, Saphetamusali—; *Garhwal:* Jhirna—; *Gujerati:* Dholimusali, Saphedmusli, Ujlimusli—; *Hindi:* Hazarmuli, Satavar, Sufedmusli—; *Marathi:* Safedamusli—; *North-West Provinces:* Khairuwa—.

4. **Asparagus gonoclados** Baker in Journ. Linn. Soc. XIV (1874) 627.—Plate 967A.

A much-branched subscandent armed undershrub; main stems smooth, terete; branches firm, green, 3-quetrous. Leaves spurred at the base with hard spines 6-13 mm. long. Cladodes 2-6-nate, 2-2.5 cm. by 1.2-1.6 mm., flat, usually falcate, ascending, firm, subcostate, narrowed to both ends, finely spinous-pointed. Flowers white, in racemes 2.5-7.5 cm. long, sometimes fasciculate or obscurely paniculate; pedicels 1.2-2 mm. long, jointed about the middle; bracts 2.5 mm. long, ovate, boat-shaped. Perianth 1.6-2 mm. long; segments spreading, the outer linear-oblong, the inner subspathulate. Anthers minute. Berry globose, 4 mm. diam., or didymous and twice as broad.

Distribution: Konkan, Kanara, W. Ghats of Madras Presidency.

The root is considered nourishing and aphrodisiac. Boiled with oil, it is applied to cutaneous diseases. It is given in gonorrhœa in 15 grains per dose. The root is used as adulterant or as substitute for *Aconitum heterophyllum.*

Arabic: Shaqaqul—; *Assam:* Hatmuli—; *Bengal:* Satmuli—; *Bombay:* Shatavari—; *Burma:* Kanyomi—; *Canarese:* Majjigegadde—; *Gujerati:* Shatavari—; *Hindi:* Shakakul—; *Malayalam:* Shatavali—; *Marathi:* Satavarimul, Zatar—; *Persian:* Shaqaqul—; *Sind:* Tilora—; *Sinhalese:* Hatavari—; *Tamil:* Kilavari—; *Telugu:* Challagaddalu, Pillipichara—.

5. **Asparagus officinalis** Linn. Sp. Pl. (1753) 313.

Stems erect and much-branched, usually 30-70 cm. high in the wild state, attaining 1.2-1.5 m. when cultivated, and elegantly feathered by the numerous clusters of subulate cladodia about 1.25 cm. long. Flowers small, of a greenish white, hanging on slender pedicels, 2 or 3 together in the axils of the principal branches, many of them with stamens only. Berries small, red, and globular.

Distribution: Cultivated.

The plant is diuretic, laxative, cardiac, and sedative.

The roots contain diuretic virtues more abundantly than the shoots. An infusion made from these roots will assist against jaundice, and congestive torpor of the liver.

In England, a medicinal tincture is made from the whole plant which allays urinary irritation, and does good against rheumatic gout.

A syrup of asparagus is employed medicinally in France: and at Aix-les-Bains it forms part of the cure for rheumatic patients to eat asparagus.

The water in which asparagus has been boiled is beneficial against rheumatism.

In the United States of America, asparagus is thought to be undeniably sedative, and a palliative in all heart affections attended with excited action of the pulse.

Catalan: Espanech, Esparraguera—; *Dutch:* Asperge—; *English:* Asparagus, Grass, Sparagrass, Sparrow Grass, Wild

Asparagus—; *French:* Asperge, Asperge officinale—; *German:* Spargel, Schwamerwartz—; *Greek:* Asparagia, Asparagonia, Asparagos—; *Italian:* Asparago, Asparago montano, Cornuda, Sparagio, Spazzole—; *Portuguese:* Espargo—; *Russian:* Sparja—; *Sinhalese:* Haithawariya—; *Spanish:* Esparrago, Esparraguera—.

YUCCA Linn.

Handsome stout shrubs or trees with simple or branched stems and terminal clusters of large linear-lanceolate or ensiform coriaceous or fleshy thorn-tipped leaves. Flowers large drooping campanulate in a many-flowered terminal panicle of racemes. Perianth segments free or nearly so. Stamens much shorter than corolla with thickened filaments and small sagittate anthers. Ovary-cells many-ovuled, incompletely 2-locellate. Fruit capsular or baccate.—Species 30.—S. United States, Central America, West Indies.

1. Stem rarely exceeding 90 cm. .... 1. *Y. gloriosa.*
2. Often attaining 4.5 m. .... 2. *Y. aloifolia.*

Y. aloifolia Linn. and *Y. gloriosa* Linn. are used medicinally in Europe.

1. **Yucca gloriosa** Linn. Sp. Pl. (1753) 319.

Woody stem rarely exceeding 90 cm. Leaves 5 cm. wide, stiff, smooth, nearly flat, usually with a few teeth when young or a few threads when old. Flowers usually white often with a reddish tinge. Fruit drooping, dry but not dehiscent.

Distribution: W. Indies. Almost naturalized in Indian gardens.

The fruit is said to be purgative, and the root detergent.

English: Adam's Needle—.

2. **Yucca aloifolia** Linn. Sp. Pl. 319.

Often attains 4.5 m. in height with generally a simple stem and a crown of narrow sword-shaped grey-green finely toothed leaves. Flowers usually white in a large dense panicle 30-45 cm. long. Fruit baccate.

Distribution: United States and Central America. Cultivated in India.

The fruit is used as a purgative in Spain.

Catalan Yuca—; *Spanish:* Yuca—.

ALOE Linn.

Dwarf fleshy leaved plants, more rarely arboreous. Leaves forming rosettes or 2-ranked, usually spinosely dentate. Flowers in terminal simple or branched racemes, usually reddish yellow with green; perianth-segments united into a cylindric or campanulate straight or slightly curved tube, tips sometimes free. Stamens as long as perianth or longer, filaments inserted into a pit in the connective. Fruit loculicidal.—Species 180.—S. Africa.

Emmenagogue, purgative, anthelmintic.

The following species are used medicinally in China—*A. vulgaris* Lam.—; in Indo China—*A. chinensis* Steud., *A. vulgaris* Lam.—; in the Philippine Islands—*A. vera* Linn.—; in Madagascar—*A. capitata* Bak., *A. deltoideodonta* Bak., *A. macroclada* Bak., *A. succotrina* Lam.—; in Southern Africa—*A. arborescens* Mill., *A. cooperi* Bkr., *A. davyana* Schoenl., *A. ferox* Mill., *A. kraussii* Bkr., *A. latifolia* Haw., *A. macracantha* Bkr., *A. marlothii* A. Berg., *A. saponaria* Haw., *A. tenuior* Haw., *A. variegata* Linn.—.

OFFICIAL:—The inspissated juice of the leaves of various species in Austria, Belgium, Denmark, France, Germany, Great Britain, Hungary, Italy, Japan, Norway, Portugal, Spain, Sweden, Turkey; *A. africana* Mill. (France, Italy, Norway); *A. arborescens* Will. (Spain); *A. ferox* Mill. (Belgium, Denmark, France, Germany, Italy, Russia, Spain, Sweden, Switzerland, Turkey, United States); *A. linguaeformis* DC. (France),—Linn. (Spain); *A. perfoliata* Linn. (France); *A. Perryi* Bak. (Italy, United States); *A. plicatilis* Miller (Italy); *A. spicata* Thunb. (France),—Thunb. (Spain); *A. succotrina* Lam. (Italy); *A. vera* Linn. (Holland, United States),—Will. (Spain); *A. vera* Linn.=*A. vulgaris* Lam. (France); *A. vera* Linn.=*A. vulgaris* Lam., *A. barbadensis* Miller (Italy); *A. vulgaris* Lam.=*A. vera* Linn. (Spain).

1. **Aloe vera** Linn. Sp. Pl. (1753) 320.

Perennial; stem short, thick, somewhat divided. Leaves sessile,

crowded, lanceolate, erect-spreading, rather concave, spiny-toothed at the margin. Scape longer than the leaves, scaly, branched; racemes long, dense; bracts short-lanceolate, membranous, longer than the short pedicel. Flowers pendulous, imbricated, yellow; anthers somewhat exserted.

Distribution: Mediterranean.—Planted in Indian gardens.

The plant is sweet, bitter; cooling; purgative, alterative, fattening, tonic, aphrodisiac, anthelmintic, alexiteric; useful in eye diseases, tumours, enlargement of the spleen, liver complaints, vomiting, fever due to bronchitis, erysipelas, skin diseases, biliousness, asthma, leprosy, jaundice, strangury, ulcers.—The flowers are anthelmintic; useful in biliousness and " vata " (Ayurveda).

The plant has a bitter bad taste; purgative, carminative, tonic, digestive; useful in inflammation of the spleen, lumbago, pain in the muscles, inflammations, ophthalmia.—The leaves are good for piles and biliousness (Yunani).

Aloes is emmenagogue, purgative, and anthelmintic. It is used in constipation, dyspepsia, menstrual suppressions, and piles.

The fresh juice of the leaves is cathartic and cooling. It is used in fever, spleen and liver troubles, also in eye diseases.

The extract is quite ineffective as an anthelmintic against hookworm (Caius and Mhaskar).

Arabic: Musabar—; *Bengal:* Ghritakumari—; *Canarese:* Brahmi, Kattali, Lole, Loli, Lolisara, Lolu, Musambra, Nolisara, Raktabala, Raktapavala, Simekattali, Tarana—; *Chinese:* Lu Hui—; *Dutch:* Aloe—; *English:* Aloe, Common Indian Aloe—; *French:* Aloes—; *German:* Aloe—; *Greek:* Aloi—; *Gujerati:* Kadvikunvar, Kunvar, Kuvara—; *Hindi:* Ghiguvara, Ghikumari, Gvarapatha, Kumari, Kuvarapatha—; *Italian:* Aloe—; *Malayalam:* Chenninayakam, Cherukattala, Chuvannakattala, Ghritakumari, Kattaavala, Kattala, Kattavaya, Kumari—; *Malta:* Aloe, Aloe comune, Zabbara—; *Marathi:* Koraphada, Koraphanta, Korkand, Kunvarpata—; *Persian:* Darakhtesinn—; Portuguese: Aloe, Aloes—; *Roumanian:* Aloes—; *Russian:* Aloe, Aloi, Sabur—; *Sanskrit:* Adala, Ajara, Amara, Ambudhisrava, Aphala, Atipichhila, Bahupatri, Bhringeshta, Brahmaghni, Dirghapatrika, Grihakanya, Ghritakumari, Kantakani, Kantakapravrita, Kanya, Kapila, Kumari, Mandala, Mata, Mridughritakumarika, Rama, Rasayani, Saha, Sthaleruha, Sthuladala, Sukantaka, Surasa, Suvaha, Tarani, Vipulasrava, Vira—; *Tamil:* Angani, Angini, Kattalai, Kodiyan, Sirukattalai, Sivappusottukkattalai, Sivappukkattalai, Sottukkattalai, Veligam—; *Telugu:* Chinnakalabanda, Chinnarakasimatta, Ettakalabanda, Kalabanda, Manjikattali, Musambaramu—; *Urdu:* Ghiqwara—; *Uriya:* Ghikuanri, Ghritokumari, Kumari, Mushoboro—.

POLYGONATUM Tourn.

Rootstock creeping. Stem leafy above. Leaves alternate opposite or whorled. Flowers in axillary 1- or more- flowered curved peduncles drooping, white green or purplish; pedicels jointed at the top; perianth tubular, mouth 6-cleft, outer lobes subvalvate. Anthers subsessile on or above the middle of the tube, included, dorsifixed. Ovary 3-gonous, style straight, stigmas 3; cells 2- or more- ovuled. Berry globose or ellipsoid, few- or many- seeded. Seeds subglobose, testa thin.—Species 30.—N. temperate regions.

Root emetic, cooling, demulcent, tonic, and antiperiodic; berries acrid, emetic, and cathartic.

P. multiflorum All. and *P. officinale* All. are used medicinally in Europe; *P. falcatum* A. Gray and *P. officinale* All. in China and Malaya.

1. **Polygonatum multiflorum** Allioni Fl. Pedem. I, 131.—PLATE 970B.

Stems 60-90 cm., round, arching. Leaves alternate, oblong-ovate, 9 by 3.8 cm., nearly sessile, pointed, lower surface glaucous. Racemes solitary, axillary, 2-5-flowered. Perianth 1.3-2 cm., tube white, lobes green. Berry 13 mm. diam.

Distribution: W. temperate Himalaya, from Kashmir to Kumaon 6,000—9,000 ft.—Europe, N. Asia, Japan.

The root is astringent, demulcent, tonic. It is useful in female weakness and fluor albus.

In Europe, the powdered root is mostly used as a poultice for bruises, piles, inflammations, and tumours.

Catalan: Sello de Salomo—; *Dutch:* Salomonszegel—; *English:* Jacob's Ladder, Ladder-to-heaven, Lady's Seal, Lily of the Mountain, Many Knees, St. Mary's Seal, Seal Wort, Solomon's-Seal, White Wort—; *French:* Faux muguet, Genoillet, Genoilliere, Genouillet, Grand sceau de Salomon, Grenouillet, Herbe aux panaris, Herbe de la rupture, Muguet anguleux, Muguet de serpents, Sceau de Salomon, Signet, Signet de Salomon—; *German:* Diebsknobelwurz, Salomonssiegel, Salomonsstiefel, Weisswurzel—; *Italian:* Ginocchietto, Poligonato, Sigillo de Salomone—; *Provencal:* Erbo di panari—; *Roumanian:* Coada cocosului—; *Russian:* Kupena, Salomonova pechat—; *Spanish:* Sello de Salomon—.

ASPHODELUS Linn.

Annual or perennial herbs; root-fibres slender or fleshy. Leaves radical, linear, 3-quetrous, or terete and fistular. Flowers racemose, on a simple or branched leafless scape; pedicels jointed, solitary in the axils of small scarious bracts. Perianth petaloid, marcescent; segments 6, free or shortly connate below. Stamens 6, hypogynous, shorter than the perianth-segments; filaments dilated at the base, enclosing the ovary; anthers oblong or almost linear, versatile, the filament inserted in a pit at the back of the connective. Ovary 3-celled; ovules 2 in each cell, collateral; style filiform; stigma somewhat 3-lobed. Fruit a globose loculicidal capsule with rugose partitions. Seeds usually solitary in each cell of the capsule; testa black, usually rugose; albumen cartilaginous; embryo rather large. —Species 12.—Mediterranean.

Tubers mucilaginous, diuretic, and emmenagogue.

A. fistulosus Linn. and *A. racemosus* Linn. are used medicinally in Europe.

The roots of *A. aestivus* Brot. (*A. apiocarpus* Hoffmseg.) and *A. ramosus* Linn. (*A. racemosus* Link) are officinal in Portugal.

1. **Asphodelus tenuifolius** Cav. in Ann. Cienc. Nat. III

(1801) 46, t. 27, fig. 2.—*A. pauciflorus* Wight Ic. t. 2062 (under *parviflorus*).—PLATE 971.

Annual. Leaves 15-30 cm. by 2.5-3 mm., terete, fistulous, acute, sheathing at the base, finely puberulous. Scapes several from the root, smooth or puberulous, much branched in the upper part, 30-60 cm. high. Flowers white, distant, laxly racemose, solitary in each bract; pedicels 4-6 mm. long, jointed below the middle; bracts broadly ovate, cymbiform, acute, 2.5 mm. long, scarious, with a strong brownish keel. Perianth 4-5 mm. long; segments oblong, obtuse, 1.6 mm. wide, with a strong conspicuous brownish costa. Stamens 3 mm. long; filaments slightly fusiform towards the top; anthers 1.2 mm. long. Style 2 mm. long; stigma small, subcapitate, minutely 3-lobed. Capsules globose, 4-5 mm. diam., erect, the valves deeply wrinkled. Seeds 3 mm. long, sharply 3-gonous, acute, black.

Distribution: Throughout India, in fields, westwards to the Canary Islands.

The seed is diuretic; applied externally to ulcers and inflamed parts (Yunani).

The seed is used as a diuretic.

Arabic: Ashrash, Khunashi—; *Gujerati:* Dungro, Dungru—; *Hindi:* Bokat, Pyajh—; *Kulanch:* Pimaluk—; *Persian:* Ashrash, Khunashi—; *Punjab:* Bringharbij, Bokat, Piazi—.

CHLOROPHYTUM Ker.

Herbs with a short hard rootstock emitting many fascicled roots, often thick and fleshy and tuber-like. Leaves radical, clustered, often broad, rarely linear or lorate. Flowers laxly racemose on a simple or branching leafless scape; pedicels usually fascicled in the axils of small scarious, or large membranous bracts. Perianth petaloid, marcescent or persistent, rarely deciduous; segments free, rotate. Stamens, 6, hypogynous, free or the 3 inner adnate to the perianth-segments, included; filaments filiform, often widened above the middle; anthers oblong or linear, dehiscing introrsely, the filaments inserted in a small pit on the back of the connective. Ovary 3-quetrous, 3-celled; ovules 4 or more in each cell; style filiform; stigma small.

Fruit a coriaceous truncate or emarginate, 3-winged, loculicidal capsule. Seeds broad, usually compressed; testa black; albumen rather hard; embryo often curved, rather large.—Species 75.—Warm regions

C. comosum Bkr. is used medicinally in Southern Africa.

1. **Chlorophytum arundinaceum** Baker in Journ. Linn. Soc. XV, 323.

Rather a pretty herb when young with suberect lanceolate many-nerved leaves and erect dense-flowered racemes or contracted panicles of white star-like flowers 1.8-2.3 cm. diam., the sepals oblong-lanceolate and usually acute, anthers as long or longer than the filaments, straight, green to yellow. Bracts usually long and overtopping the shortly pedicelled buds.

Distribution: E. Himalaya, Assam, Bihar, Burma

The root is used as a tonic.

Gond: Ganjagata—; *Hasada:* Kulaebo—; *Hindi:* Safedmusli—; *Mundari:* Pirijadu—; *Naguri:* Pirijadu—.

ALLIUM Linn.

Fœtid scapigerous herbs; bulbs coated. Leaves usually narrow, often fistular. Flowers capitate or umbelled, all at first enclosed in 1-3 membranous spathes, stellate or campanulate; sepals 6, free or connate below. Stamens hypogynous or inserted on the perianth; filaments free or connate below, anthers oblong. Ovary 3-gonous, 3-celled; style filiform, stigma minute, cells few-ovuled. Capsule small, loculicidal. Seeds few, compressed, testa black.—Species 325.—N. hemisphere.

A. Bulbs not seated on a rhizome
  1. Leaves flat, sometimes keeled. Filaments of inner whorl 3-cuspidate, the central cusp anther-bearing
    a. Head with many bulbils. Flowers white .... 3. *A. sativum.*
    b. Head without bulbils. Flowers red or greenish white 6. *A. ampeloprasum.*
  2. Leaves fistular, terete or semiterete. Filaments not cuspidate, but those of inner whorl sometimes with a tooth each side of the broad base
    a. Stamens included. Perianth red .... 4. *A. schoenoprasum*

b. Stamens about as long as perianth. Flowers white or lilac .... 1. *A. ascalonicum.*

c. Stamens longer than perianth. Flowers greenish white .... 2. *A. cepa.*

B. Bulbs elongate seated on a creeping rhizome. Leaves flat Stamens shorter than perianth, perigynous .... 5. *A. tuberosum.*

Bulbs stimulant, expectorant, diuretic, anthelmintic, and rubefacient.

The following species are used medicinally in Europe—*A. ampeloprasum* Linn., *A. ascalonicum* Linn., *A. cepa* Linn., *A. odorum* Linn., *A. roseum* Linn., *A. sativum* Linn., *A. schaenoprasum* Linn., *A. scorodoprasum* Linn., *A. sphaerocephalum* Linn., *A. ursinum* Linn., *A. victoriale* Linn.—; in China—*A. bakeri* Regel, *A. cepa* Linn., *A. fistulosum* Linn., *A. japonicum* Regel, *A. nipponicum* Fr. and Sav., *A. odorum* Linn., *A. sativum* Linn., *A. scorodoprasum* Linn., *A. victoriale* Linn.—; in Indo China—*A. sativum* Linn., *A. thunbergii* G. Don, *A. tuberosum* Roxb.—; in Cambodia—*A. ampeloprasum* Linn., *A. cepa* Linn., *A. sativum* Linn.—; in Malaya—*A. bakeri* Regel, *A. odorum* Linn.—; in the Philippine Islands—*A. cepa* Linn., *A. sativum* Linn.—; in North America *A. ampeloprasum* Linn., *A. canadense* Linn., *A. sativum* Linn.—; in Brazil—*A. ascalonicum* Linn., *A. cepa* Linn., *A. sativum* Linn., *A. scorodoprasum* Linn.—; in the Gold Coast—*A. ascalonicum* Linn., *A. sativum* Linn.—; in South Africa—*A. sativum* Linn.—.

The bulbs of *A. Cepa* Linn., *A. sativum* Linn., and *A. Scoroprodasum* var. β Linn. (*A. ophioscorodon* Don) are officinal in Portugal.

1. **Allium ascalonicum** Linn. Amoen. Acad. IV (1759) 454. —PLATE 972.

Root consisting of a fascicle of several small ovate-oblong bulbs. Leaves basal only, fistular, shorter than the scapes. Scapes 30-60 cm. long, tapering from the swollen base. Umbels globular, dense, with flowers only.

Distribution: **Widely cultivated.**

The properties are the same as those of *A. sativum* (Yunani).

It is used to cure earache, a small piece being placed in the meatus. It is also fried in butter and preserved in honey as an aphrodisiac.

In the Gold Coast, the bulbs are sometimes ground and rubbed on the skins of feverish children, which is said to cure them. Sometimes they are mixed with palm vine and large pepper and heated in the sun, the mixture being used to cure fever. They are also used as an antidote for snake-bite and poisoning.

Ada: Sabola—; *Afghanistan:* Gandana—; *Ashanti:* Gyeene—; *Bengal:* Gundhun—; *Catalan:* Escalunas—; *Dutch:* Sjalot—; *English:* Eschallot, Eschalot, Shallot, Shalot—; *Ewe:* Sabula—; *Fanti:* Gyeene—; *Fort Sandeman:* Khukhai—; *French:* Ail d'Ascalon, Echalotte—; *Ga:* Sabola—; *German:* Aschlauch—; *Hindi:* Ekakandalasum—; *Italian:* Cipollina, Scalogno—; *Krepi:* Sabala—; *Krobo:* Samanachupa, Samanang—; *Languedoc:* Tsolotto—; *Malta:* Shallots, Scalogno, Xalotti—; *North-West Provinces:* Gandana—; *Portuguese:* Chalotus das cozinhas—; *Punjab:* Gandana, Gandhan—; *Roumanian:* Hagima, Hajme—; *Russian:* Sharlot—; *Saharanpur:* Gandana—; *Spanish:* Chalote, Escaluna—; *Twi:* Gyeene, Sopradaa—; *Urdu:* Lehsun—.

2. **Allium cepa** Linn. Sp. Pl. (1753) 300.—PLATE 970A.

Perennial; bulb thick, globular, tunics membranous. Scape tall, hollow, inflated and leafy near the base. Leaves in 2 rows, shorter than the scape; umbel globular, many-flowered; pedicels 4-5- times as long as the flowers; spathe composed of 2-3, reflexed valves; perianth white, segments ovate-oblong, acutish; filaments longer than the perianth, connate with each other and the perianth at its base, and dilated, the outer toothless, the inner with a triangular, obtuse tooth on either side at the base.

Distribution: Native country unknown. Cultivated everywhere.

The tuber is pungent; tonic, aphrodisiac; improves taste; useful in vomiting, biliousness, body pains, tumours, bleeding piles, epistaxis.—The seeds are fattening; useful in caries of the teeth and urinary discharges (Ayurveda).

The bulb has a sharp taste; tonic, stomachic, appetiser; useful in malaria, ophthalmia, diseases of the spleen, vomiting, asthma, scabies, earache, piles; enriches the blood of women; applied to the eyes in night-blindness (Yunani).

The bulbs contain an acrid, volatile oil, which acts as a stimulant, diuretic, and expectorant. Onions are occasionally used in fever, dropsy and catarrh, and chronic bronchitis; in colic and scurvy. Externally as rubefacient, and, when roasted, as a poultice. Considered by natives hot and pungent, useful in flatulency.

They are also described as aphrodisiac. Eaten raw they are emmenagogue. The juice rubbed on insect-bites is said to allay irritation. The centre portion of a bulb, heated and put into the ear, is good for earache. The warm juice of the fresh bulb is also used for this purpose.

The seeds yield a colourless clear oil used in medicine.

Onion tea will often relieve sleepless and irritable children when opium and other narcotics have failed.

The expressed juice of the bulbs, with salt dropped in the eye, is said to be useful in night-blindness. A poultice of the bulb is also used (B. D. Basu).

The bulb is crushed and the acrid smell is utilised emitted like smelling-salts for fainting and hysterical fits. Said to increase the peristaltic action of the intestines, and is prescribed in obstruction. Used in jaundice, hæmorrhoids, and prolapsus ani, also in hydrophobia.

As an external application, onions are used in scorpion-stings and to allay irritation in skin diseases. They have anti-periodic properties attributed to them, and are said to mitigate cough in phthisis, and mixed with vinegar, used in sore throat.

For scorpion-sting the crushed bulbs are applied as a poultice, or the juice is rubbed on the part stung. This is useless as a symptomatic and antidotal treatment (Caius and Mhaskar).

The bulb is considered pectoral, diuretic, and emmenagogue in Cambodia. It is given internally in bronchitis, liver complaints, dysmenorrhœa, vertigo, and migraine. Externally it is applied topically in the treatment of lymphangites, adenites, carbuncles, etc.

Arabic: Basal—; *Assam:* Piyas—; *Bengal:* Palandu, Piyaj—; *Bombay:* Kanda, Puyaj—; *Burma:* Kesunni, Kyetthwonni—; *Cambodia:* Khtim—; *Canarese:* Kunbali, Nirulli, Vengayam—; *Catalan:* Seba—; *Chinese:* Hu Ts'ung Ts'ong, Ts'ong Tse—; *Cutch:* Kanda—; *Danish:* Loegen—; *Dutch:* Uijen—; *English:* Onion—; *French:* Ciboule, Ognon, Oignon commun, Oignon de cuisine—; *German:* Bolle, Zipolle, Zippel, Zwiebel—; *Greek:* Krommyon—; *Gujerati:* Dungari—; *Hausa:* Albasa—; *Hebrew:* Bhazal—; *Hindi:* Piyaz—; *Hova:* Tongolo, Tongolobe, Tongolovazaha—; *Hungarian:* Hagyma—; *Ilocano:* Lasona—; *Italian:* Ceola, Cipolla—; *Kano:* Guda, Shaja—; *Konkani:* Kando, Piau—; *Languedoc:* Ceba, Cebo, Cepa—; *Malayalam:* Bawang—; *Malta:* Common Onion, Cipolla, Basal, Basla—; *Marathi:* Kanda—; *Pampangan:* Sibuyas—; *Persian:* Piyas—; *Polish:* Cebula—; *Portuguese:* Cebola, Cebola ordinaria, Cebola das hortas—; *Punjab:* Piyaz—; *Roumanian:* Ceapa—; *Russian:* Luk—; *Sanskrit:* Dirghapatra, Mahakanda, Nripakanda Nripapriya, Nripavhaya, Nripeshtha, Palandu, Rajapalandu, Rajapriya, Rajeshtha, Raktakanda, Rochaka, Yavaneshtha—; *Santal:* Piaj—; *Sind:* Dungari—; *Sinhalese:* Lunu—; *Sokoto:* Gabu, Gudaji, Lawashi, Safa—; *Spanish:* Cebolla—; *Swedish:* Roedloek—; *Tagalog:* Lasuna, Sibuyas—; *Tamil:* Iravengayam, Irulli, Vellavengayam—; *Telugu:* Nirulli, Vulligaddalu—; *Turkish:* Sochan—; *Urdu:* Piyaz—.

3. **Allium sativum** Linn. Sp. Pl. (1753) 296.—Plate 973.

Leaves flat, scape slender, spathes long-beaked, heads bearing bulbils and flowers, sepals lanceolate acuminate, inner filaments 2-toothed.

Distribution: Widely cultivated.

The bulb is pungent; heating, oleaginous; tonic, aphrodisiac, fattening, digestive, anthelmintic; improves appetite, voice, complexion; useful in diseases of the eye and the heart, low fevers, bronchitis, inflammation, piles, leucoderma, asthma, "vata", lumbago, tumours, epileptic fits, thirst, earache (Ayurveda).

The bulb has a sharp taste; diuretic; carminative, alexipharmac, aphrodisiac; useful in inflammation, paralysis, pain in the body and the joints, troubles of the spleen, liver, and lungs; clears the voice; good for lumbago, chronic fevers, thirst, caries of the teeth, leucoderma; thins the blood (Yunani).

Irritant and rubefacient; as a carminative and gastric stimulant, garlic aids digestion and absorption of food, and is given in flatulence; as an expectorant, it has a special influence over the bronchial and pulmonary secretions, useful in cases of dilated bronchi with fetid expectoration; in pulmonary phthisis it often diminishes cough, reduces expectoration, lessens night-sweats, improves appetite, helps in gaining weight, and renders sleep regular; as an emmenagogue it promotes the flood of menses; tonic, carminative and stimulant of the skin and kidneys; causes copius diuresis, and hence is used in dropsy; applied to the noses of hysterical girls when in a state of swooning; given with common salt to relieve colic and nervous headache; applied in the form of poultice to the chest, also to the spine in infantile convulsions, over the abdomen in gastro-intestinal catarrh; anthelmintic and antiseptic; antituberculous, antipyretic, analgesic, anti-phlogistic, escharotic and hygroscopic; oil prepared with garlic bulb fried therein is often used in rheumatic pain, to absorb inflammation over joints and to relieve earache. The medicinal use and pharmacological action as detailed above were known to the ancient Hindus many centuries ago, and seem to be supported by modern researches. The use of the garlic in India as an antiseptic is very common, and it has recently been noticed that the classes of Indian people who regularly use garlic as food are more free from beri-beri and influenza, although the case should have been otherwise, in view of their dirty habits and of the insanitary surroundings in which they live. Garlic is freely used in this country after child-birth with good results, and its use in suspected cases of diphtheria and in certain infectious diseases is being extended. From what is already known it promises to be a potent remedial agent in the treatment of tuberculosis, etc., and it remains to be ascertained in what form the administration of the drug will be more effective. According to present knowledge, however, fresh garlic juice, unfiltered, appears to be best in most cases. To avoid the disagreeable odour, a thick extract of garlic juice may be preferable and administered in the form of pills, but, an alcoholic ester of garlic oil, if found to give no unfavourable reaction when injected, may supersede other forms of administration (*Indian and Eastern Druggist*; May 1922).

Garlic enters into the confection of various Malayan ipohs.

Whether given internally or applied externally garlic is useless in the treament of snake-bite (Mhaskar and Caius).

In Cambodia, the leaves are used in the treatment of asthma.

The essential oil obtained from garlics has been studied chemically (*Journ. Chem. Soc.*; 1893).

Annam: Cu toi—; *Arabic:* Saum, Taum—; *Assam:* Naharu—; *Bengal:* Lashan, Lasun, Rasun—; *Bhote:* Gokpas—; *Bombay:* Lusoon—; *Burma:* Kesumphiu, Kyatthoubega, Kyetthwunbya—; *Cambodia:* Kanchhai—; *Canarese:* Belluli—; *Catalan:* All, Ay—; *Chinese:* Suan, Suan T'eou, Ta Suan—; *Deccan:* Shunam—; *Dutch:* Knoflook, Knoplook, Look—; *English:* Churl's Treacle, Garlic, Poor Man's Treacle—; *French:* Ail, Ail commun, Thériague du paysan—; *Ga:* Ayo—; *German:* Knoblauch, Lauch—; *Greek:* Aglidion, Skorodon—; *Gujerati:* Lasan—; *Hausa:* Tafarnuwa—; *Hindi:* Lahsan, Lasan—; *Hova:* Tongologasy, Tongolonkova—; *Ilocano:* Banag—; *Italian:* Aglio—; *Jolo:* Bauangpoti—; *Konkani:* Lossun—; *Krobo:* Samanachupang—; *Malay:* Dawang, Lasuna—; *Malta:* Garlic, Aglio, Teum tal ichell—; *Marathi:* Lasun, Lasunas—; *Persian:* Sir—; *Polish:* Czosnek—; *Portuguese:* Alho, Alho ordinario—; *Roumanian:* Aiu, Usturoiu—; *Russian:* Chesnok—; *Sanskrit:* Arishtha, Bhutabhna, Dirghapatraka, Grinjana, Katukanda, Lashuna, Mahakanda, Mahaushana, Mlechhakanda, Rahuchhishta, Rahutsrishta, Rasona, Rasonaka, Shuklakanda, Ugragandha, Vatari, Yavaneshta—; *Santal:* Rasun—; *Sinhalese:* Sudulunu—; *Spanish:* Ajo—; *Tagalog:* Bawang—; *Tamil:* Vellaippundu—; *Telugu:* Vellullitellagadda—; *Turki:* Samsak—; *Urdu:* Lehsun—; *Visayan:* Baoang, Bauang, Ganda, Laso—; *Xosa:* iVimba — 'mpunzi—.

4. **Allium schoenoprasum** Linn. Sp. Pl. 301.

Bulbs clustered narrow, scales membranous. Leaves 1-2, slender, 10-25 cm. long, terete or grooved, above smooth or scaberulous; sheaths elongate, scape 15-35 cm., stout or slender. Heads subglobose, dense-flowered; pedicels equalling or shorter than the campanulate pink or pale purple flowers. Sepals 8-17 mm., linear or lanceolate, bearing the stamens near their bases. Filaments included, all simple, filiform, dilated at the base. Capsule small, globose; cells 2-seeded.

Distribution: W. Himalaya, from Kashmir to Kumaon, 8,000—11,000 ft., Baluchistan —Westwards to the Atlantic, N. America.

The therapeutic properties are the same as those of *A. cepa.*

Dutch: Bieslook—; *English:* Chives—; *French:* Appétit, Ciboulette, Cive, Civette, Fausse échalotte—; *German:* Schmittlauch—; *Italian:* Cipolletta—; *Portuguese:* Cebolinho—; *Provence:* Cipoleta—; *Roumanian:* Ceapa frantuzeasca—; *Russian:* Lukriezanetz—; *Suanish:* Cebollana, Cebollino—; *Vaud:* Branlette—.

5. **Allium tuberosum** Roxb. Hort. Beng. (1814) 24.

Bulbs elongate, cylindric, with white fleshy root-fibres; scales grey, fibrous. Leaves 15-30 cm. by 2-4 mm., sometimes concave and twisted, 4-5 basal erect narrow-linear, flat, tall, compressed or trigonous above. Scape 30-45 cm. Head 20-40-flowered. hemispheric, 2.5-3.8 cm. diam., lax-flowered; spathes 1-2, small; pedicels ascending, 1.3-3.2 cm., much longer than the small white or pink stellate flowers; sepals 4-6 mm., oblong-lanceolate, acute or obtuse, at length reflexed; filaments simple, linear, included, connate below and perigynous, inserted on the bases of the sepals, gradually dilated from below the middle to the base, outer shorter, broader; style short. Ovary globosely obovoid, deeply 3-lobed; stigma obscurely 3-toothed; cells 3-ovuled. Capsule obcordate.

Distribution: W. Himalaya, Khasia Hills, apparently wild. Cultivated in Bengal. —China, Siam, Japan.

The seeds are given in spermatorrhœa.

6. **Allium ampeloprasum** Linn. Sp. Pl. (1753) 295.—*A. porrum* Linn.

Stem leafy. Leaves linear, flat, keeled, shorter than the tall terete scape. Head globose, very many- and dense- flowered, pedicels longer than the campanulate white flowers, linear filaments 2-toothed.

Distribution: Extensively cultivated.

The bulbs are used to hasten the suppuration of boils.

In its raw state the bulb is a stimulating expectorant. Its juice acts energetically on the kidneys, and dissolves the calculous formations in the bladder.

For chilblains, chapped hands, and sore eyes, the juice of a leek squeezed out, and mixed with cream, has been found curative.

In Cambodia, the whole plant is used as a diuretic and emollient.

Arabic: Kiras, Kirath—; *Bengal:* Paru—; *Burma:* Tan Kyet thoon—; *Cambodia:* Krachhai—; *Catalan:* All porret, Porro—; *Dutch:* Look, Prei—; *English:* Leek, Porret—; *French:* Ail à tuniques, Poireau, Porreau, Porrée, Pourriole—; *German:* Lauch, Porree, Porrey—; *Italian:* Porro—; *Languedoc:* Pourrat—; *Maltese:* Currat, Currat salvagg—; *Philippines:* Siboyas-sa-Taal—, *Portuguese:* Alho porro—; *Roumanian:* Praz—; *Russian:* Porei—; *Spanish:* Ajete, Ajo puerro, Puerro, Puerro agreste, Puerro de vina—.

URGINEA Steinch.

Herbs with tunicate bulbs. Leaves radical, linear, or lorate. Flowers racemose on a long leafless scape, often appearing before the leaves; pedicels short or long, articulate; bracts small. Perianth petaloid, campanulate; segments 6, subequal. Stamens 6, adnate at or near the base of the perianth-lobes, included; filaments filiform or thickened at the base; anthers oblong or linear, dehiscing introrsely. Ovary 3-celled, often 3-gonous; ovules numerous in each cell; syle tapering towards the base. Fruit an oblong, 3-quetrous, loculicidal capsule. Seeds usually many in each cell, compressed; testa black; embryo raher large; albumen fleshy.—Species 40.—Mediterranean, Africa, India.

1. Bracts evanescent .... 1. *U. indica.*
2. Bracts minute, persistent .... 2 *U. coromandeliana.*

Bulbs acrid, stimulant, expectorant, emetic, diuretic, and purgative.

U. scilla Steinh. is used medicinally in Europe; *U. burkei* Bkr. in Southern Rhodesia; *U. altissima* (Linn. f.) Bkr. and *U. macrocentra* Bkr. in South Africa.

Official :—The bulbs of *U. maritima* Linn. in Russia; *U. maritima* Baker in Austria, Denmark, Japan Norway, Sweden; *U. maritima* L. Baker in Hungary; *U. maritima* (Linne) Baker in Germany, Switzerland, Turkey, the United States of America; *U. Scilla* Steinh. in Belgium, France, Great Britain, Holland, Italy, Portugal, Turkey; *U. Scilla* Steinh. (*U. maritima* Baker, *Scilla maritima* Linn.) in Spain.

1. **Urginea indica** Kunth Enum. IV (1843) 333.—Plate 974.

Bulb pale, 5-10 cm. long, ovoid, thick. Leaves appearing after the flowers, 15-45 by 1.3-2.5 cm., nearly flat, sub-bifarious, linear, acute. Scape erect, brittle, 30-45 cm. long by 4-6 mm. diam. at the base. Flowers dingy brown, very distant, in slender laxly flowered racemes 15-30 cm. long; bracts minute, soon falling; pedicels 2.5-3.8 cm. long, slender, spreading or decurved. Perianth campanulate; segments 10 by 2.5-3 mm. oblong-oblanceolate, obtuse, with 2 or 3 strong approximate nerves down the middle. Stamens rather more than 6 mm. long; filaments flattened; anthers 2.5 mm. long. Style obconic. Capsules ellipsoid, tapering to both ends, 1.3-2 cm. long, the cells 6-9-seeded. Seeds elliptic, 6 by 3 mm., flattened, black.

Distribution: W. Himalaya, Bihar, Chota Nagpur, Burma, W. Peninsula.—Tropical Africa.

The tuber is pungent, heating, anthelmintic, alexiteric; useful in vomiting (Ayurveda).

The bulb is stomachic, diuretic, emmenagogue, anthelmintic, purgative, alexiteric; useful in paralysis, bronchitis, asthma, dropsy, rheumatism, renal calculi, leprosy, skin diseases, headache, diseases of the nose, internal pains, scabies (Yunani).

The bulb was administered in the form of a syrup as an expectorant to cases of bronchial catarrh and chronic bronchitis in the out-patient department, and was found useful in those affections. The syrup was prepared from the expressed juice of the bulbs the strength being 1 in 2 (Koman).

The assays carried out by Chopra and De (1926) show that *U. indica* is in no way inferior to the official *U. maritima* of the United States and *U. scilla* of Great Britain (*Ind. Med. Gazette*; 1931).

Arabic: Aansalehindi, Basalelfar, Basalelundal, Baslulbarrehindi, Baslulfarehindi, Isqilehindi—; *Bengal:* Banpiaaj, Janglipiaaj, Kande—; *Bombay:* Kochinda, Kolkanda, Janglikanda, Janglipiaz, Ranakanda—; *Burma:* Padaingkyetthwon, Tankaettwa, Tokesun—; *Deccan:* Janglipiyaz, Kandra—; *English:* Indian Squill—; *Gujerati:* Janglikanda, Rankando—; *Hindi:* Janglikanda, Janglipiyaz, Kanda, Kande—; *Kumaon:* Ghesuwa—; *Malayalam:* Kanthanga, Kattulli—; *Marathi:* Janglipyajha, Ranachakande, Rankanda—; *North-West Provinces:* Iskil, Kunda, Kundri—; *Punjab:* Kachwassal, Phaphor—; *Persian:* Piyazedashtiehindi, Piyazemoshehindi—; *Saharanpur:* Kanda—; *Sanskrit:* Kolakanda, Krimighna, Panjala, Patalu, Putakanda, Putalu, Suputa, Vanapalandam, Vasrapanjala—; *Sinhalese:* Vallum—; *Tamil:* Narivengayam—; *Telugu:* Adavithellagadda, Nakkavalligadda—; *Urdu:* Janglipiyaz—.

2. **Urginea coromandeliana** Hook. f. Fl. Brit. Ind. VI, 347. —*Scilla coromandeliana* Roxb. Fl. Ind. II (1832) 147.

Bulb globose, 3.8 cm. diam. Leaves 15-20 cm. by 8-13 mm., very narrow, subacute. Scape 30-45 cm.; pedicels 2.5-3.2 cm.; bracts 4 mm., ovate, acute, persistent. Flowers drooping, dull green and purplish; sepals 8 mm. long, 1-nerved, inner bearded at the tips, tips rounded; filaments clavate; style shorter than the ovary, narrowly obconic.

Distribution: Coromandel Coast.

The bulb is used as a substitute for Squill.

SCILLA Linn.

Herbs with tunicate bulbs. Leaves radical, linear, lorate or oblong. Flowers in racemes, on a simple leafless scape; bracts small. Perianth petaloid, persistent, stellate or campanulate; segments 6, subequal, often recurved. Stamens 6, adnate at or near the base of the perianth-segments; filaments usually filiform; anthers ovate or oblong, dehiscing introrsely. Ovary 3-celled; ovules usually few in each cell (often 2); style filiform; stigma small, capitate. Fruit a globose 3-lobed loculicidal capsule, the cells 1-2-seeded. Seeds obovoid or subglobose; testa thin, black; embryo shorter than the firm albumen.—Species 100.—Temperate regions of Old World.

Bulbs expectorant, emetic, diuretic, and purgative.

S. lilio-hyacinthus Linn., *S. pancration* Steinh., and *S. peruviana* Linn. are used medicinally in Europe; *S. cooperi* Hook., *S. galpini* Bkr., *S. inandensis* Bkr., *S. lanceaefolia* (Jacq.) Bkr., *S. natalensis* Planch., and *S. rigidifolia* Kunth. in Southern Africa.

OFFICIAL:—The bulbs of *S. maritima* Linn. in Hungary and Spain; *S. maritima* var. *radice alba* G. Bauh. (*Ornithogalum maritimum* Tournefort and Brot.) in Portugal.

1. **Scilla indica** Baker in Saund. Refug. Bot. III (1870) App. 12.—*Ledebouria hyacinthina* Roth. Wight Ic. t. 2040.—PLATE 975.

Bulb ovoid or globose, 2.5-3.8 cm. diam. Leaves appearing with the flowers, 7.5-15 by 1.3-2.5 cm., variable, from oblong to lanceolate or oblanceolate, subacute, narrowed into a sheathing petiole, rather fleshy, waved, obtusely keeled, sometimes rooting at the tips, dull green above and often blotched with black, paler and glaucous beneath. Scape 5-12.5 cm. long, rather stout. Flowers greenish purple, in cylindric, many-flowered racemes 5-10 cm. long; bracts minute, scarious; pedicels filiform, 6-10 mm. long. Perianth-segments 4-6 by 1.6-2 mm., linear-oblong, obtuse. Filaments 4 mm. long, purple; anthers 1.6 mm. long, ellipsoid. Style 4-5 mm. long. Capsules 4 mm. long and broad, membranous.

Distribution: Bihar, Central India, Chota Nagpur, W. Peninsula, Ceylon.—Abyssinia.

The bulbs have the same therapeutical properties as those of *Urginea indica.*

The assays carried out by Chopra and De (1926) show that *S. indica* is in no way inferior to *Urginea scilla* and *U. maritima* of the British and American Pharmacopœias (*Ind. Med. Gazette*; December 1931).

Bengal: Suphadiekhus—; *Bombay:* Bhuikanda, Lahanaranakanda, Nanijanglikando, Paharikanda—; *Hindi:* Bhuikanda, Paharikanda—; *Tamil:* Sirunarivengayam—.

Lilium Linn.

Tall, bulbous, leafy, unbranched, usually very large-flowered herbs. Flowers axillary or in terminal racemes. Perianth infundibular, segments 6, usually narrowly nectariferous at the base. Stamens hypogynous, anthers large dorsifixed versatile. Style long, stigma globose (rarely 3-fid). Capsule erect, coriaceous, loculicidal, very many-seeded. Seeds vertically compressed; testa pale, membranous, appressed.—Species 60.—N. temperate regions.

1. Leaves petioled, broadly cordate	1. *L. giganteum.*
2. Leaves sessile, narrowly linear	2. *L. wallichianum.*

Bulbs demulcent and detergent.

L. bulbiferum Linn., *L. candidum* Linn., *L. martagon* Linn. are used medicinally in Europe; *L. concolor* Salisb., *L. japonicum* Thunb. in China; *L. longiflorum* Thunb. in Annam.

1. **Lilium giganteum** Wall. Tent. Fl. Nep. 21, t. 12, 13 (excl. syn.).—Plate 976.

Stems 1.8-3.6 m., tapering upwards, hollow. Leaves alternate, cordate, broadly ovate, 12.5-28 by 10-25 cm., lower leaves the largest. Bracts ovate, soon falling off. Flowers shortly stalked, in a terminal raceme. Perianth 10-15 cm. long, white; tube purple inside, tips of segments rounded, recurved. Stigma obscurely 3-lobed. Capsule 5-7.5 cm.

Distribution: Temperate Himalaya, from Garhwal to Sikkim, 5,000—10,000 ft., Khasia Hills.

The leaves are employed as an external cooling application to alleviate the pains of wounds and bruises.

Jaunsar: Giotra—

2. **Lilium wallichianum** Schult. f. Syst. Pl. VII, 1689.—Plate 977.

Bulbs small, on a creeping rootstock; scales many, short, ovate, acuminate. Stem 1.2-1.8 m., base ascending few-flowered. Leaves 15-30 cm. by 6-20 mm., narrowly linear; nerves 3-5, faint. Flowers subsolitary, horizontal, sweet-scented; pedicel long; perianth 15-25 cm., narrowly tubular below, then infundibular with the upper third recurved; tube greenish outside; segments subequal, oblanceolate, 5 cm. broad; stamens much shorter than the perianth; anthers 2.5 cm., orange-yellow; style recurved at the top; stigma conoidal. Capsule 3.8-5 cm.

Distribution: W. Himalaya, Nepal and Kumaon, 3,000—4,000 ft.

The dried bulb scales possess demulcent properties and are used like salep in pectoral complaints (Atkinson).

Hindi: Findora—.

Fritillaria Linn.

Characters of Lilium, but perianth campanulate or with segments spreading from near the naked or bearded base, nectaries usually broad, stigmas 3-fid with short spreading truncate divisions, rarely capitate and 3-lobed.—Species 50.—N. temperate.

1.	Leaves whorled or opposite	2. *F. roylei.*
2.	Lower leaves opposite, upper whorled; uppermost with cirrhose tips	3. *F. cirrhosa.*
3.	Leaves crowded lanceolate, lower opposite, upper longer whorled	1. *F. imperialis.*

The bulbs are known as asthma and tuberculosis remedies.

F. imperialis Linn. and *F. meleagris* Linn. are used medicinally in Europe; *F. cirrhosa* D. Don., *F. Delavayi* Franch., *F. roylei* Hook, *F. verticillata* Willd. var. *thunbergii* Bak. in China.

1. **Fritillaria imperialis** Linn. Sp. Pl. (1753) 303; Bot. Mag. t. 194 and 1215.

Bulb large, globose, of broad obtuse gibbous fleshy yellowish scales, strong-smelling. Stem 90-120 cm., robust, naked below. Leaves crowded, 15-25 by 2.5-5 cm., lanceolate, lower opposite obtuse, upper acute longer whorled, often 10 in a whorl. Flowers umbelled, 5-8, yellow or brick-red, not tessalate; bracts leafy, whorled, erect, linear. Perianth 5-6.3 cm. long; segments 1.9-3.8 cm. broad. Filaments flattened below. Nectary large, rounded. Capsule 5 cm. long, obovoid, almost 6-winged, umbonate.

Distribution: W. Himalaya, westwards to Kurdistan.

The bulbs are used for their emollient, resolvent, and diuretic properties.

Catalan: Corona imperial—; *Dutch:* Keizerskroon—; *English:* Fritillary—; *French:* Fritillaire impériale—; *German:* Kaiserkrone—; *Roumanian:* Bibilica—; *Russian:* Tsarskie Kudri—; *Spanish:* Corona imperial—.

2. **Fritillaria roylei** Hook. Ic. Pl. t. 860.

A hairless, bulbous herb. Bulb small, globose, scales membranous. Stem 15-60 cm. high, erect, unbranched, naked below, often mottled green and reddish brown. Leaves 3-6 in a whorl or opposite, linear-lanceolate, 5-12.5 cm. by 3-13 mm., the lowest ones sometimes 2.5-3.8 cm. broad, tips of the upper leaves often linear and hooked. Flowers nodding, terminal, solitary or 2-4 in a short raceme. Perianth 2.5-3.8 cm. long, campanulate; segments 6, distinct, yellow-green, chequered with dull purple, each with a large gland at the base, tips rounded, not bent back. Stamens 6, at the base of the perianth-segments, and much shorter. Anthers linear-oblong, attached at the base. Ovary oblong, 3-celled. Style thick, straight, divided at the top into 3 short, pointed lobes. Capsule obovate, 13-17 mm., bluntly 6-angled. Seeds many, small, flattened, slightly winged.

Distribution: W. temperate Himalaya, 8,000—13,000 ft., from Kashmir to Kumaon.

The bulbs are powdered and boiled with dried orange skin and administered for tuberculosis and asthma.

Chinese: Chen Ch'uan Pei.

3. **Fritillaria cirrhosa** Don. Prodr. 51.

Lower leaves opposite, upper whorled, uppermost with cirrhose tips. Flowers 1-2 tessellate, nectary broad naked.

Very nearly allied to F. Roylei, and perhaps, as Wallich believed, a variety of that plant, the leaves are however larger and narrower and the uppermost have cirrhose tips.

Distribution: Central and E. Himalaya, Sikkim 11,000—16,000 ft.

The dried corms are given in asthma, bronchitis, and tuberculosis.

Chinese: Chen Ch'uan Pei.

COLCHICUM Linn.

Corm coated. Leaves radical, linear or lanceolate. Scape very short, sessile amongst the leaf-sheaths, 1-3-flowered. Flowers large erect. Perianth funnel-shaped; tube very long and slender; lobes 6, subequal, suberect. Stamens 6, inserted in the bases of the segments, included; anthers dorsifixed, versatile, introrse. Ovary sessile, 3-celled; styles 3, long, filiform; cells many-ovuled. Capsule chartaceous, septicidal. Seeds subglobose; testa appressed brown. —Species 45.—Europe, W. Asia, N. Africa.

The whole plant, but more especially the corms, acrid and narcotic, sudorific, emetic, diuretic, and a drastic purgative.

C. autumnale Linn., and *C. variegatum* Linn. are used medicinally in Europe.

OFFICIAL :—The seeds of *C. autumnale* Linn. in Austria, Belgium, Denmark, France, Germany, Holland, Hungary, Italy, Japan, Norway, Spain, Sweden, Switzerland, Turkey; *C. neapolitanum* Tenore and various allied species in Italy.

The corm and seeds of *C. autumnale* Linn. in Great Britain, Portugal, and the United States of America.

1. **Colchicum luteum** Baker in Gaud. Chron. (1874) 33. —PLATE 978A.

Corm gibbously ovoid, coats dark brown. Leaves few, lorate, linear-oblong or oblanceolate, obtuse, appearing with the flowers, short at flowering time, at fruiting 15-30 cm. by 8-13 mm., tip rounded. Flowers 1-2 (in spring), 2.5-3.8 cm. diam. when expanded; perianth golden yellow, tube 7.5-10 cm., segments oblong or oblanceolate, obtuse, many-nerved; stamens shorter than the perianth; filaments very much shorter than the long yellow anthers; style filiform, much longer than the perianth. Capsule 2.5-3.8 cm.; valves with long recurved beaks.

Distribution: W. temperate Himalaya.—Afghanistan, Turkestan.

The root has a bitter bad taste; carminative, laxative, aphrodisiac; lessens inflammation, pain, heat of the brain; applied to old piles to lessen pain and heal wounds; useful in headache, gout, rheumatism, diseases of the liver and spleen (Yunani).

The root is used in Afghanistan for the preparation of "Harantutiha", a medicine of great repute.

Hindi: Hirantutiya—; *Sanskrit:* Hiranyatutha—; *Urdu:* Suranjanetalkh—.

GLORIOSA Linn.

Climbing herbs; stems leafy, springing from a naked tuberous rootstock. Leaves alternate, opposite or 3-nately whorled, lanceolate, strongly nerved, with a long spiral tendril-like apex. Flowers large, showy, axillary, solitary; pedicels reflexed at the tip. Perianth petaloid, persistent; segments 6, subequal, spreading or reflexed, the margins often undulate. Stamens 6, hypogynous; filaments filiform; anthers linear, dorsifixed, versatile, dehiscing extrorsely. Ovary 3-celled; ovules numerous in each cell; style filiform, deflexed, with 3 subulate arms, stigmatose within. Fruit a large coriaceous septicidal capsule. Seeds subglobose; testa spongy, wing-like; embryo cylindric.—Species 5.—Tropical Asia and Africa.

G. superba Linn. is used medicinally in Guinea, *G. virescens* Lindl. in South Africa.

1. **Gloriosa superba** Linn. Sp. Pl. (1753) 305; Wight Ic. t. 2047.—PLATE 978B.

A herbaceous tall glabrous branching climber; rootstock of arched, solid, fleshy-white, cylindric tubers 15-30 by 2.5-3.8 cm., pointed at each end, bifurcately branched of V-shaped, producing a new joint at the end of each branch; roots fibrous; stems annual, 3-6 m. long, given off from the angles of the young tubers.

herbaceous. Leaves sessile or nearly so, 7.5-15 by 2-4.5 cm., scattered or opposite, or sometimes (from the suppression of the internodes) ternately whorled, ovate-lanceolate, acuminate, tip ending in a tendril-like spiral, base cordate; nerves parallel. Flowers large, axillary, solitary, or subcorymbose towards the ends of the branches from the nearness of the leaves, remaining for about 7 days without withering; pedicels 7.5-15 cm. long, the tips deflexed. Perianth-segments reaching 6.3 cm. by 8-13 mm., linear-lanceolate with crisply waved margins, greenish at first, then yellow, passing through orange and scarlet to crimson. Filaments 3.8-4.5 cm. long, spreading; anthers nearly 13 mm. long. Style reaching 5 cm. long; the arms about 6 mm. long. Capsules 4.5 by 2 cm., linear-oblong. The change of colour which takes place during the time the flowers remain without drooping, has caused a discrepancy in descriptions by several authors, and new species have actually been founded in consequence of the variation.

Distribution: Throughout tropical India, Ceylon, Malay Peninsula.—Cochin-China, tropical Africa.

The tuber is pungent, bitter, acrid; heating; anthelmintic, laxative, alexiteric, abortifacient; useful in chronic ulcers, leprosy, inflammation, piles, abdominal pain, itching, thirst; used to remove the placenta from the uterus; causes biliousness (Ayurveda)

The root is useful in bowel complaints; the flower for fever and thirst.—The tuber is astringent, expectorant; used in bleeding piles and thirst (Yunani).

The tuberous root, powdered and reduced to a paste, is applied to the navel, suprapubic region, and vagina, with the object of promoting labour. In retained placenta, a paste of the root is applied to the palms and soles, while powdered *Nigella* seeds and long pepper are given internally with wine.

In Bombay, it is supposed to be an anthelmintic, and is accordingly frequently administered to cattle affected by worms. In Madras, it is believed to be specific against the bites of poisonous snakes, and the stings of scorpions, and is also used as an external application in parasitical affections of the skin.

There are two varieties of this plant. The root of one plant divides dichotomously, that of the other does not divide at all, but appears as a single piece shooting into the ground. The former is supposed by the natives to be the male plant, and the latter the female. The male root is gathered during the flowering season, cut up in thin slices and soaked in butter-milk to which a little salt is added. In this composition it is soaked by night and dried by day for four or five days. It is eventually dried well and preserved. By this process, its poisonous properties are said to be removed. When so prepared, and administered by giving a piece or two internally in a case of cobra bite, it is said to be an effectual antidote in cobra poisoning. In scorpion and centipede stings and bites, relief is obtained from the pain by applying a paste of the root rubbed up with cold water and then warming the part affected over the fire. This paste is applied also for parasitic affections of the skin.

The starch obtained from the root by washing is given internally in gonorrhœa.

In Guinea, the tubers are used in cataplasm for neuralgia. The juice of the ground leaves is used to destroy lice in the hair.

The corms and leaves are useless in the antidotal treatment of snake-bite; they are equally useless as collyrium and an errhine (Mhaskar and Caius). The root is also useless in the treatment of scorpion-sting (Caius and Mhaskar).

Ajmere: Rajahrar—; *Bengal:* Bisha, Bishalanguli, Ulatchandal—; *Bombay:* Karianag—; *Burma:* Hseemeetouk, Simadon, Simmidai—; *Canarese:* Agnisikhe, Akkatangaballi, Huliyuguru, Karadikanninagadde, Kolikutuma, Nangulika, Onapu, Sivaraktaballi, Sivasaktiballi—; *Chopi:* Pembekushe—; *Deccan:* Natkabachhnag—; *French:* Superbe de Malabar—; *Gujerati:* Dudhiovachhnag—; *Hasada:* Bulungkucungba—; *Hausa:* Baurairai—; *Hindi:* Kalihari, Kariari, Karihari, Kathari, Kulhari, Langali, Languli—; *Java:* Akarsoengsang—; *Kano:* Gudumarzomo—; *Malayalam:* Kantal, Malattamara, Mettonni—; *Marathi:* Indai, Karianag, Nagkaria—; *Naguri:* Jarjuri, Ondokaba—; *North-West Provinces:* Kurihari—; *Porebunder:* Shingdiovachhnag—; *Punjab:* Kariari, Mulim—; *Sanskrit:* Agnimukhi, Agnisikkha, Ahijihoa, Amrita, Ananta, Dipta, Garbhanuta, Garbhapatani, Garbhhaghhatini, Hali, Halini, Haripriya, Indrapushpika, Kalikari, Kandali, Langaliki, Languli, Nakta, Pushpasaurabha, Shakrapushpi, Sikkhajihoa, Svarnapushpa, Vanhivaktra, Vidyutajvala, Vishalya, Vranahrita—; *Santali:* Siricsamano—; *Sinhalese:* Neyangalla, Niyangalla—; *Siripati:* Bubungcukuru, Jolaba—; *Sokoto:* Gatarinkurege—; *South Africa:* Climbing Lily, Superb Lily, Turk's Cap—; *Tamil:* Akkinichilam, Anaravam, Ilangali, Iradi, Irumbu, Kandal, Kalappaikkilangu, Karltigaikkilangu, Kirttigaikkilangu, Kannovuppundu, Kodai, Milangili, Nabikkodi, Pattrai, Sengandal, Sivappukkandal, Talaichuruli, Tondri, Vendondri—; *Telugu:* Adavinabhhi, Agnisikhha, Kalapagadda, Langali, Pottidumpa, Pottinabhhi—; *Tonga:* Nyamahlokane—; *Tulu:* Balipapu, Kenkannadapu—; *Urdu:* Kanol, Kulhar—; *Uriya:* Gorbhhoghhatono, Meheriaphhulo, Panjangulia, Ognisikhha, Uttomorati—.

PONTEDERIACEAE

Fresh-water and marsh herbs, erect or floating. Leafy stems 1-foliolate, springing from the buried rootstock or from the joints of the floating stem; basal leaf long-petiolate, blade floating or upraised. Flowers hermaphrodite, racemose or spicate, rarely fasciculate or paniculate at the ends of 1-leaved stems or branches; bract under inflorescence spathe-like; bracts under the flowers minute or obsolete. Perianth inferior, petaloid, marcescent, usually tubular; lobes 6, sub-2-seriate, similar or the 3 inner smaller. Stamens 6 or 3, unequally adnate to the perianth-tube or the base of the perianth-lobes, usually declinate, the upper shorter; filaments free; anthers oblong (rarely ovate), with 2 parallel distinct cells. Ovary superior, 3-celled with axile placentas, or 1-celled with parietal placentas, each placenta with many 2-seriate ovules (sometimes only one in each cell fertile), anatropous; style filiform or columnar; stigma terminal, entire or lobed. Fruit a dry, membranous, loculicidally 3-valved (rarely indehiscent) capsule. Seeds ovoid or ellipsoid, small; testa longitudinally ribbed; albumen floury or horny; embryo central, cylindric.—Genera 6. Species 21.—Tropics.

The Order is therapeutically inert.

MONOCHORIA Presl.

Aquatic herbs; rootstock creeping, clothed with leaf-sheaths. Leaves radical and solitary at the top of the emerging stem or branches, ovate-cordate, sagittate or lanceolate; petioles of the radical leaves long, those of the cauline leaves shorter. Flowers in a raceme, sessile within the axil of the cauline leaf and fasciculately long-pedicellate, or pedunculate and subspicately short-pedicellate. Perianth campanulate; tube 0; lobes 6, distinct subequal. Stamens 6, adnate to the base of the perianth-lobes, or hypogynous, one usually largest with its filament toothed on one side; anthers basifixed, dehiscing by a terminal ultimately elongate slit. Ovary 3-celled; ovules many in each cell; style filiform; stigma minutely 3-lobed. Fruit an oblong membranous loculicidal capsule. Seeds many, ovoid, obtuse, many-ribbed; embryo cylindric in the centre of floury albumen.—Species 4.—E. Africa to Australia.

M. vaginalis Prest. is used medicinally in China.

1. **Monochoria vaginalis** Presl Reliq. Haenk. I (1830) 128. —*Pontederia vaginalis* Burm; Roxb. Corom. Pl. II, t. 110.— PLATE 979.

Rootstock short, suberect, spongy. Leaves very variable, 5-10 by 3.2-5 cm., from linear to ovate or ovate-cordate, usually acuminate; petioles of the lower leaves long, stout, terete, the peduncles emerging from the channelled sheaths of the uppermost leaves. Inflorescence centripetal; flowers blue, usually spotted with red; in subspicate racemes which are globose at first, the rhachis lengthening as the flowers expand, the terminal flower opening first; pedicels short, 3-6 mm. long. Perianth campanulate, 6-partite, the segments 10 mm. long, nearly equal in length, 3 of them narrowly obovate, nearly 3 mm. wide, broader than the other 3 which are linear-oblong, 1.6-2 mm. wide. Filament of the large anther 5 mm. long, with an acute horn at one side, the filaments of the smaller anthers filiform, 5 mm. long; anthers linear-oblong, the larger anther 2.5 mm. long, the smaller anthers 1.6 mm. long. Ovary 2.5 m. long, ellipsoid, glandular; style 3 mm. long; stigma 3-lobed. Fruit ellipsoid, less than 13 mm. long, glandular outside. Seeds 0.8 mm. long, ellipsoid, rounded at each end, pale, with many brown ribs.

Distribution: Throughout India, Ceylon, Malay Peninsula.—Malay Islands, China, Japan, tropical Africa.

The root is chewed for toothache, and the bark eaten with sugar for asthma (Atkinson).

Bengal: Nanka—; *Chinese:* Hu Ts'ao—; *Mundari:* Demdemara, Huringdemdem—; *Philippines:* Calaboa, Hinguion—; *Tagalog:* Calabao—; *Telugu:* Nirokancha—.

XYRIDACEAE.

Erect, tufted, rush-like, scapigerous, glabrous herbs. Leaves radical, elongate, linear or subulate; sheaths short. Scape stout or slender, as long as or shorter than the leaves, terete, angled, or compressed, naked. Flowers hermaphrodite, sessile in the rigid, dark brown, imbricating bracts of a terminal globose or ovoid conelike head or spike, opening one at a time; bracts orbicular or obovate, coriaceous, convex, persistent. Perianth inferior, 2-seriate. Sepals (or bracteoles) 3, deciduous, membranous, the 2 lateral small (like bracteoles), narrowly boat-shaped, arched, keeled or winged, the dorsal sepal petaloid, broader, arching over the young flowers, sometimes absent. Petals 3, clawed, obovate or spathulate, coloured. Stamens 3, perfect, shorter than the corolla-lobes and attached near their bases; anthers sagittate, 2-celled, dorsifixed, dehiscing longitudinally; staminodes 3, alternating with the corolla-lobes or 0. Ovary superior, 1-celled or imperfectly 3-celled; placentas 3, basal and confluent or parietal; ovules numerous, orthotropous; style usually 3-fid, with long arms; stigmas capitate or dilated. Fruit a loculicidally

3-valved capsule, or with the top circumscissile. Seeds minute, oblong, strongly ribbed; embryo minute, in floury albumen.--Genera 2. Species 70.—Tropical and subtropical. Mostly American.

The Order is not therapeutically defined.

XYRIS Linn.

Characters of the order.

1. Leaves loriform .... 1. *X. indica.*
2. Leaves narrowly linear .... 2. *X. anceps.*

X. glabrata Griseb. is used medicinally in Guinea.

1. **Xyris indica** Linn. Sp. Pl. (1753) 42.—PLATE 980.

An erect annual 15-50 cm. high. Leaves usually shorter than, but sometimes as long as the scape, 3-10 mm. broad, spongy, linear, narrowed to an obtuse or acute tip. Scape stout, deeply grooved and acutely angled. Flowers in ellipsoid spikes 13-20 mm. long; bracts many, orbicular or cuneately obovate, usually broader than long, dark red-brown, shining, very coriaceous, with scarious margins. Flowers bright yellow, 13 mm. across. Lateral sepals narrowly boat-shaped, dorsally winged, the wing serrulate. Claw of petals as long as the sepals; limb obovate or suborbicular, erose, veined. Filaments short, broad; anthers oblong, 0.8 mm. long. Style, including the 3 arms, 1.25 mm. long, the arms about 0.6 mm. long; stigmas truncate. Capsules ovoid, 5 mm. long. Seeds minute, ellipsoid, very strongly ribbed.

Distribution. Bengal, Burma, Assam, W. Peninsula, Ceylon.– Malay Islands.

The natives of Bengal esteem it a plant of great value, because they think it an easy, speedy and certain cure for the troublesome eruption called ringworm (Roxburgh).

The plant is also used in itch and leprosy.

Bengal: Chinaghauza, Chineghas, Dabidubi—; *Hindi:* Dabiduba, Dadmari—; *Malay:* Jeringu padang, Rumput bagan—; *Malayalam:* Kochilletri, Kochillettipullu—; *Mundari:* Huringdudumuri—; *Sanskrit:* Dadamari, Dadumari—.

2. **Xyris anceps** Lam. Ill. I, 132.

Leaves rigid, often twisted, linear acuminate, bases broad, red, 10-60 cm. long, 3 mm. wide. Scape slender, twisted, 15-60 cm. long. Head ovoid to cylindric, 2 cm. long or less. Bracts light brown, convex, margins scarious. Bracteoles keeled and spinulose. Petals obcuneate orbicular, edges fimbriate, 6 mm. wide.

Distribution: S. Deccan Peninsula, Ceylon, Burma, Malay Peninsula.—Malay Islands.

The leaves are boiled in oil and used for leprosy, itches, skin diseases.

COMMELINACEAE.

Herbs prostrate or erect, rarely climbing, very rarely shrubby. Leaves costate, with sheathing bases; nerves parallel. Flowers more or less irregular, hermaphrodite or by abortion polygamous, often cymose; cymes scorpioid, straight or reduced to one flower, sometimes paniculate, often enclosed in spathe-like bracts; floral bracts usually small, opposite the pedicels or obsolete, sometimes herbaceous and dichotomously imbricate. Perianth inferior, 6-partite, 2-seriate; outer segments 3, herbaceous, often persistent; inner segments 3, petaloid, free or united into a tube below, spreading above, marcescent. Stamens 6, adnate to the base of the perianth-segments, all perfect or 2 or more reduced to staminodes; filaments often bearded with jointed hairs; anthers oblong or globose, often dissimilar. Ovary 3- or 2-celled, free; ovules solitary or few, on the inner angles of the cells, orthotropous. Fruit a loculicidal capsule or indehiscent, with a thin fragile or a succulent pericarp. Seeds angled; testa smooth or rugose; albumen floury; embryo minute, remote from the hilum.—Genera 30. Species 400.—Mostly tropical and subtropical.

A. Capsule loculicidal. Stamens 3, perfect with 1-3 staminodes
  1. Cymes solitary, included in a spathe. Ovary 3-celled, cells, 1-2-ovuled .... COMMELINA
  2. Cymes naked, panicled, rarely in a spathe .... ANEILEMA.

B. Capsule loculicidal. Stamens 6, perfect	
1. Cymes from imbricating bracts, scorpioid, or 1-2-few-flowered Corolla tubular below	CYANOTIS.
2. Flowers panicled. Stem erect	FLOSCOPA.

The Order is not therapeutically defined.

COMMELINA Linn.

Herbs usually slender and creeping below. Leaves with lax sheaths, petiolate or not. Flowers in usually 2-fid scorpioid cymes emerging singly from a terminal complicate, or funnel-shaped, or hooded spathe; flowers of the upper cyme-branch small, deciduous, of the lower fertile; fruiting pedicel and capsule retracted within the spathe. Sepals 3, membranous, the 2 inner often connate below. Petals 3, longer than the sepals, two large, clawed, the third smaller, subsessile. Stamens 3 perfect, with 2-3 imperfect; anthers oblong, one usually longer than the others. Ovary 3- (rarely 2-) celled, 2 of the cells 1-2-ovulate, the third cell if present 1-ovulate or empty. Fruit a loculicidal capsule hidden in the spathe by the decurving of the pedicel after flowering, the posticous cell sometimes indehiscent or obsolete, or the 2 anticous cells empty, indehiscent, and connate as a ligulate body, from which the posticous cells falls away. Seeds ellipsoid or angled; testa reticulate, pitted or rugose.—Species 115. —Tropical and subtropical.

A. Capsule 3-celled, 2 anticous cells loculicidal, each usually 2-seeded	
1. Spathes 1.7-2.5 cm.	3. *C. nudiflora.*
2. Spathes 3.8-5 cm.	5. *C. salicifolia.*
3. Spathes 8-13 mm.	4. *C. benghalensis*
B. Capsule 3-celled, subequally 3-valved. Seeds free in the cells	1. *C. obliqua.*
C. Capsule 2-celled	2. *C. suffruticosa.*

Mucilaginous, astringent and styptic, antirheumatic, anthelmintic.

C. communis Linn. is used medicinally in China; *C. pallida* Willd. and *C. tuberosa* Linn. in Mexico; *C. deficiens* Herbert in Brazil; *C. barbata* Lam. and *C. benghalensis* Linn. in La Reunion; *C. africana* Linn. and *C. benghalensis* Linn. in South Africa; *C. nudiflora* Linn. in the Gold Coast.

1. **Commelina obliqua** Ham. in Don. Prodr. Fr. Nep. (1825) 45 (non Vahl).—PLATE 981.

Stem 60-90 cm. high, stout, branched, glabrous. Leaves 10-18 by 2.5-5 cm., sessile or petiolate, lanceolate or elliptic-lanceolate, acute or caudate-acuminate, membranous, glabrous, scabrous or villous; sheaths reaching 2.5 cm. long, the mouth bearded with long hairs. Spathes sessile or nearly so, 2-2.5 cm. long and as broad as long, solitary or crowded in terminal heads, acute, turbinately funnel-shaped, glabrous or subscabrid, usually filled with a clear glutinous liquid. Flowers blue, about 17 mm. across, in simple (not branched) racemes; large petals clawed, orbicular. Ovary 3-celled, the cells 1-ovulate. Capsules 10 mm. long, trigonous-obovoid, subequally 3-valved, 3-celled, 3-seeded. Seeds 6 mm. long, oblong or ellipsoid, smooth, puberulous, lead-coloured.

Distribution: Throughout India, Ceylon.—Malay Islands.

The root is useful in vertigo, fevers and bilious affections, and as an antidote to snake-bites (Atkinson).

It is refrigerant and laxative, and useful in strangury and costiveness (Loureiro).

The root is not an antidote to snake-venom (Mhaskar and Caius).

Bengal: Jatakanchura, Jatakanshira—; *Bijnor:* Kana, Korna—; *Hindi:* Kana, Kanjuna—; *Kumaon:* Kanjura—.

2. **Commelina suffruticosa** Bl. Enum. III.—PLATE 982.

Stems from a short rhizome, erect, branched, stout or slender, 30 cm. tall, with distant tubular sheaths. Leaves subterminal, ovate-lanceolate acuminate, base narrowed sessile, scabrid pubescent, 7.5 cm. long, 2.5 cm. wide; sheaths 13 mm. long, hairy near the mouth. Spathes shortly peduncled, ovate-cordate, 2 cm. long. Raceme simple. Flowers 6 to 12, blue or white. Capsule bilobed, 2-celled, obovate, 6 mm. long, pedicelled. Seed one in each cell, ellipsoid, rugose, brown.

Distribution: Tropical India from Nepal, Sikkim and Bengal to Central India and the Malay Peninsula.—Malay Islands.

The Santals apply the root to sores (Campbell).

Santali: Dare orsa—.

3. **Commelina nudiflora** Linn. Sp. Pl. (1753) 41.

Diffuse, nearly glabrous; root fibrous; stems 60-90 cm. long and upwards, branching from the base; branches prostrate or subscandent, often rooting at the rather distant nodes, the tips ascending. Leaves sessile, 3.8-7.5 by 1.3-1.7 cm., lanceolate or ovate-lanceolate, acute or acuminate, glabrous or puberulous, the sheaths sometimes exceeding 2 cm. long, loose, glabrous, usually with ciliate margins. Peduncles 13-16 mm. long, spreading, or erect. Spathes 2-3.2 cm. long, ovate or ovate-lanceolate, acute or acuminate, base rounded or cordate with rounded lobes, glabrous or pubescent. Cymes usually two, 1- to 3- flowered; flowers 13-17 mm. across, the two interior petals obovate with long claws, dark blue, the exterior subsessile, orbicular, of a paler blue or nearly white, sometimes subobsolete. Ovary 3-celled, of which two cells are 2-ovulate, the third 1-ovulate. Capsules 5 mm. long, broadly oblong, acuminate, coriaceous, 5-seeded. Seeds oblong-cylindric, tuberculate and reticulate, brown.

Distribution: Throughout India, Ceylon. Malay Peninsula.—Many tropical and subtropical countries.

The plant is used on the Gold Coast to cure a disease called " okwaha "—a swelling in the groin—producing very itchy spots and sores and swellings. The leaves are pounded, mixed with the seeds of *Leea guineensis* G. Don. and those of *Piper nigrum*. The mixture is put in a plantain leaf, which has first been put in the fire to prevent it splitting too easily. The mixture in the plantain leaf is then applied to the affected parts and bound, and it affords relief. It is untied after three days. After this time the swelling bursts.

Ashanti: Onyame bewu na mawu—; *Awuna:* Abgormaku maku, Agbenokui nokui—; *Ewe:* Agbormaku maku, Agbenokui nokui—; *Fanti:* Nyame bewu ansang na mewu—; *Ga:* To lilairy—; *Gujerati:* Shismuli, Shismuliyun—; *Hindi:* Kanshura—; *Malay:* Pulau aur, Rumput kukupu, Tapak eti—; *Marathi:* Kina, Velichibhaji—; *Nzima:* Nyamele wua ngwosu—; *Sanskrit:* Katsapriya, Koshapushpi—; *Sinhalese:* Girapala—; *Twi:* Onyame bewu na mawu—.

4. **Commelina benghalensis** Linn. Sp. Pl. (1753) 41.

Stem 60-90 cm. long, slender, dichotomously branched from the base upwards; branches diffuse, glabrous or pubescent, creeping and rooting below. Leaves 2.5-7.5 by 1.3-3.8 cm., ovate or oblong, obtuse, sessile or shortly petiolate, pubescent or villous on both surfaces, base unequal-sided, rounded, cuneate or cordate; nerves 7-11 pairs; sheaths short or long, pubescent or villous, the margins ciliate or sometimes bearded with rufous hairs. Spathes 1-3 together, funnel-shaped or turbinate, auricled on one side, pubescent or hirsute; peduncles very short or 0. Upper branch of cyme 2-3-flowered; the lower 1-2-flowered, not uncommonly depauperate or obsolete. Sepals small, oblong, pubescent. Petals blue; larger petals orbicular or transversely oblong. Anthers oblong. Ovary 3-celled, 2 cells 2-ovulate, 1-cell 1-ovulate. Capsules 6 mm. long, pyriform, membranous, 5-seeded. Seeds oblong, closely pitted.

Distribution: Throughout India, Ceylon.—China, tropical Asia and Africa.

The plant is bitter; useful in leprosy and "vata" (Ayurveḍa).

In La Reunion, the plant is considered emollient and mucilaginous. It is much used in the form of a decoction as drink, lotion, bath.

The Sutos prepare a medicine from the plant for treating barrenness in women.

Bengal: Kachradam, Kanchara—; *Canarese:* Hittagani—; *Gujerati:* Mhotunshushmuliyun—; *Hindi:* Kanchara—; *La Reunion:* Grosse herbe d'eau, Grosse trainasse—; *Madras:* Kanavalei—; *Malay:* Rumput mayiam—; *Marathi:* Kena—; *Pampangan:* Biasbias—; *Philippines:* Uligbonggon—; *Punjab:* Chura, Kanna—; *Sanskrit.* Kanchata, Marishajalaja, Paniya, Tanduliya—; *Sind:* Chura, Kanna—; *Sinhalese:* Diyameneriya—; *Suto:* Khotswana—; *Tagalog:* Alicbanggon—; *Tamil:* Kanangakarai—; *Telugu:* Nirukassuvu, Vennadevikura—; *Twi:* Onyame bewu na mahu—; *Visayan:* Cabilao, Sabilao, Sabilaonggalabaan—.

5. **Commelina salicifolia** Roxb. Fl. Ind. I (1832) 172.

Stems slender, decumbent, sometimes rooting, glabrous, with long internodes. Leaves 7.5-15 by 0.4-1.3 cm., linear-lanceolate, glabrous or nearly so; sheaths 1.6-2.5 cm. long, ciliolate. Spathes 2.5-5 cm. long, ovate-lanceolate, axillary, acute or acuminate, glabrous, base rounded; peduncles 1.3-3.2 cm. long, slender. Flowers small, polygamous; branches of the cyme equal, usually 1-2-flowered. Sepals free, ovate, obtuse, the 2 inner connate below, larger than the outer. Petals dark blue, the 2 larger ovate with undulate margins and long claws, the smaller one broadly ovate, entire, subsessile or with a very short claw. Stamens 3 fertile; one anther large, lunate, the other 2 smaller, ellipsoid; staminodes 3, clavate. Capsules 6 mm. long, quadrate, membranous. Seeds black, powdered with white, smooth, ovoid or subglobose, 3 mm. long, appendaged at one end with a whitish membranous appendage.

Distribution: Bengal, Assam, Burma, W. Peninsula, Java.

The plant is used in dysentery and insanity.

Bengal: Panikanchira—; *Hindi:* Jalpipari—; *Sanskrit:* Jalapippali, Langulu—; *Santali:* Bir Kana arak—.

ANEILEMA R. Br.

Simple or branched erect or decumbent herbs; roots usually fibrous (sometimes tuberous). Leaves usually alternate, sometimes all radical, occasionally clustered under the inflorescence, usually narrow and sessile (rarely broad and petiolate). Flowers in axillary and terminal panicles, bracteate and bracteolate; bracts not spathaceous. Sepals 3, membranous, free. Petals 3, obovate, equal. Stamens 2 or 3 with perfect anthers and 2-4- (rarely 0) reduced to staminodes with imperfect anthers; filaments slender, bearded or not. Ovary sessile, 2-3-celled; cells 1-many-ovulate; style slender, naked or bearded; stigma minute. Fruit a loculicidal capsule. Seeds 1 or more in each cell, with a thick hard rugose or pitted testa. —Species 85.—Tropics, especially of the Old World.

Astringent and tonic.

In the Gold Coast, the leaves of *A. beninense* Kunth, and *A. ovato-oblongum* P. Beauv. are used in enemas to cure constipation.

1. **Aneilema scapiflorum** Wight Ic. VI (1853) 30, t. 2073. —PLATE 983.

A tufted herb; root of elongate pisiform tubers. Leaves all radical, erect, 10-20 by 1-1.6 cm., narrowly ensiform, finely acuminate, glabrous or nearly so, slightly narrowed at the base. Flowers in erect elongate panicles on terminal leafless scapes; scape together with the panicle 20-45 cm. long; sheaths on the scape below the panicle 2-5.7 cm. long, embracing the scape, finely acuminate with an oblique mouth; upper bracts amplexicaul, ovate, acuminate or truncate, membranous, often spotted with small spots. Sepals 6 mm. long, elliptic-oblong, subacute, 3-5-nerved, purple-green. Petals blue, 1 cm. long, obovate, reticulately veined. Stamens 3 perfect and 3 staminodes; filaments all bearded with blue hairs; anthers of fertile stamens blue, those of the staminodes yellow. Capsules 6 mm. long, obovoid. Seeds 5 or 6 in a cell, superposed, 1.6 mm. diam., sharply 3-gonous.

Distribution: Temperate and tropical Himalaya, Bhutan, W. Peninsula, Ceylon.

The root is said to have astringent and tonic properties. It is considered useful in headache, giddiness, fever, jaundice, and deafness. It is also an antidote to poisons, and regarded as a cure for snake-bite.

The root-bark dried in the shade is said to have been employed with benefit in asthma. Also used in colic, piles and infantile convulsions. It is used for incontinence of urine. The dried powder, mixed with sugar, is used as an aphrodisiac. With the juice of the *tulsi* leaves, it is administered for pains in the kidneys, and is one of the chief remedies used by the Hakims in spermatorrhœa.

The root is not an antidote to snake-poison (Mhaskar and Caius).

Bengal: Kureli—; *Gujerati:* Sismulia—; *Hindi:* Siyahmusli—; *Persian:* Musliesiyah—.

CYANOTIS Don.

Herbs prostrate or creeping. Leaves small. Flowers in axillary and terminal scorpioid cymes, formed of large imbricate, 2-seriate, secund, foliaceous, falcate bracteoles, the petals and stamens alone exserted (rarely the corolla-tube also exserted); sometimes the flowers in exposed racemes or fascicled in the ochreate leaf-sheath. Sepals 3, subequal, free or connate below. Petals 3, subequal, often united into a tube below; the limb orbicular. Stamens 6, all perfect, subequal, hypogynous or epipetalous; filaments usually bearded, often inflated towards the apex; anthers oblong. Ovary 3-celled; ovules 2 in each cell, collateral, one erect, the other pendulous. Fruit a 3-celled loculicidal capsule. Seeds usually 2 in each cell, superposed, cubical or pyramidal, usually rugose.—Species 35.—Palæotropics.

1. Capsule with no free central column after dehiscence ...... 1. *C. tuberosa.*
2. Flowers axillary in the sheaths of the leaves .... 2. *C. axillaris.*

The genus is therapeutically inert.

1. **Cyanotis tuberosa** Schult f. Syst. VII (1830) 1153.—PLATE 984.

Root of fusiform tubers; stem 15-90 cm. long, swollen and very hirsute at the very base, suberect or prostrate and creeping below, densely villous or almost glabrous. Leaves sessile, the radical and lower cauline 15-25 by 0.8-2.5 cm., often purple beneath, linear or ensiform, villous, the upper cauline leaves much shorter; sheaths of radical leaves 2.5 cm. long, glabrous, those of the cauline leaves shortly silky. Cymes villous or densely hirsute, 1.3-2.5 cm. long, usually pedunculate, in the axils of short ovate acute leaves (bracts) which are shorter than the cyme, strongly falcately decurved bracteoles imbricate in 2 series, usually many, 8-17 mm. long. Sepals 6 by 1.6 mm. linear-lanceolate, acute, densely villous and ciliate. Corolla 8 mm. long, bluish purple; lobes 2.5-3 mm. long, ovate, subacute. Filaments spirally twisted, fusiform towards the tips, densely bearded above with blue hairs; anthers 1.25 mm. long, yellow. Style thickened at the tip, with a tuft of hairs near the apex. Capsules 4 by 2.5 mm., ellipsoid, the upper half hairy, the lower half glabrous. Seeds 1.6 mm. long and broad, truncate at the base, shortly conic at the apex, obscurely rugose, brown.

Distribution: W. Peninsula, Ceylon.

The root is used by the Santals in long-continued fevers, and also worms in cattle (Campbell).

Santali: Hodojerengarak, Meromchunchi—.

2. **Cyanotis axillaris** Schult f. Syst. VII (1830) 1154.—Plate 985.

Root fibrous; stem annual, 15-45 cm. long, stout or slender, diffusely branched, leafy, glabrous; branches suberect and creeping below, or prostrate, glabrous or sparsely hairy, often coloured; internodes 2.5-7.5 cm. long. Leaves sessile, 5-15 cm. by 4-8 mm., narrowly linear or linear-lanceolate, acute or acuminate, flat, glabrous or more or less hairy; sheaths 6-10 mm. long, inflated, ciliate. Flowers violet-blue, clustered in the inflated sheaths, the cymes reduced to axillary fascicles of flowers with the small linear or linear-lanceolate bracteoles almost concealed in the leaf-sheaths. Sepals 10 mm. long, spathulate-lanceolate, acuminate, sparsely hairy. Corolla-tube 8 mm. long; corolla-lobes broadly ovate, subacute. Filaments fusiform below the tip, bearded. Style fusiform at the apex, naked. Capsules rather more than 6 mm. long, oblong-ellipsoid, beaked, shortly stipitate, quite glabrous except the beak. Seeds 2.5 mm. long, oblong, compressed, truncate at the base, rounded at the apex with a very short conical tip, beautifully mottled, dark brown, shining.

Distribution: Throughout India, Ceylon.—E. Asia, tropical Australia.

On the Malabar Coast, this is viewed as a useful remedy in tympanitis (Rheede).

In Behar, it is used as an external application in cases of ascites, especially when mixed with a little oil (Ainslie).

Bombay: Itsaka—; *Hindi:* Baghanulla, Soltraj—; *Jolo:* Hauli—; *Madras:* Valukkeippul—; *Tamil:* Nirpulli—; *Telugu:* Golagandi—.

Floscopa Lour.

Erect or subscandent herbs. Leaves lanceolate. Flowers in terminal or axillary thyrsoid panicles, bracteate; cymes secund-flowered (not scorpioid). Sepals 3, oblong, free. Petals free, obovate. Stamens 6, perfect (or one imperfect); filaments glabrous.

Ovary 2-celled; cells 1-ovuled; style simple. Capsule 2-celled, crustaceous. loculicidal. Seeds hemispheric.—Species 15.—Tropics and subtropics.

The genus is therapeutically inert.

1. **Floscopa scandens** Lour. Fl. Coch. 193.

Herb, creeping and ascending, 15-30 cm. tall, glabrous. Leaves elliptic-lanceolate or linear-lanceolate acute, edges ciliate. Panicle large dense, 2.5-7.5 cm. long, viscid hairy; rhachis pink. Sepals ovate viscid hairy. Petals pink. Capsule shorter than sepals.

Distribution: Throughout tropical India, in swamps from E. Nepal, Sikkim and the Khasia Hills to Travancore, Ceylon and Malacca.—E. Asia and tropical Australia.

In Lakhimpur, the juice of the stem is put into sore eyes (Carter).

Lakhimpur: Karahimlu—; *Malay:* Rumput kumpai tikus, Rumput tapak eti—.

FLAGELLARIACEAE.

Shrubs with long, usually climbing leafy stems. Leaves many-nerved, usually long, with sheathing bases. Flowers small, regular, hermaphrodite or diœcious, in terminal panicles; bracts often lanceolate; bracteoles minute or 0. Perianth inferior, persistent; segments 6, free, small, imbricate, sub-2-seriate, dry or subpetaloid. Stamens 6, hypogynous; filaments free, filiform; anthers ovate or oblong, basifixed, 2-celled. Ovary superior, 3-celled; ovule solitary in each cell, anatropous, adnate to the axis; style short with 3 stigmatic arms, or styles 3 distinct. Fruit a small berry or a drupe with 1-3 pyrenes. Seeds laterally attached; testa membranous or thick; albumen floury; embryo lenticular.—Genera 3. Species 10.—Warm regions of the Old World.

The Order is not therapeutically defined.

FLAGELLARIA Linn.

A climbing shrub with long slender stems. Leaves many, lanceolate, with tendril-like tips; nerves many, parallel. Flowers many small, hermaphrodite fascicled or spicate along the branches of a terminal panicle; bracts small, scale-like. Perianth subpetaloid; segment 6, ovate, obtuse. Stamens 6, hypogynous. Ovary 3-celled; ovule solitary, affixed laterally; style divided nearly to the base into 3 subentire or 2-partite stigmatic arms. Fruit a small globose or ovoid drupe, with a thin succulent exocarp and a bony 1-2-seeded endocarp. Seed globose or ovoid; testa appressed, membranous.—Species 4.—Warm regions of the Old World.

The genus is therapeutically inert.

1. **Flagellaria indica** Linn. Sp. Pl. (1753) 333.

A reed-like climber, quite glabrous, climbing over lofty trees by the leaf-tendrils; stem nearly 2.5 cm. thick towards the base, terete, smooth; branches clothed with cylindric smooth, striate, closed, truncate sheaths; branchlets as thick as a crow-quill. Leaves sessile, 15-25 cm. long, variable in breadth, lanceolate from a rounded base, shortly narrowed into the sheath, drawn out at the apex into a slender spiral tendril, many-nerved; sheaths cylindric, striate, 2-auricled at the apex. Flowers white, in shortly pedunculate irregularly laxly branched panicles 15-30 cm. long. Outer perianth-segments 2.5 mm. long, broadly ovate or suborbicular, obtuse; inner segments similar, more or less unequal. Anthers 2 mm. long, deeply 2-fid at the base. Ovary to top of stigma 2.5 mm. long; style-arms about 1.25 mm. long. Drupe pisiform, red, smooth.

Distribution: Throughout India, chiefly near the coast, Ceylon.—Tropical Asia and Africa.

The leaves are said to be astringent and vulnerary (Bailey).

Betsimisaraka: Vahipika—; *Canarese:* Panambuvalli—; *English:* Indian Rattan Lily, Rattan Creeper, Wild Rattan—; *La Reunion:* Jolivave, Olivave, Ovivave—; *Malayalam:* Panampuvalli—; *Philippines:* Balenguay, Balingay—; *Sakalave:* Voambaipika—; *Sinhalese:* Goyiwel—; *Tagalog:* Arayam, Balingnay, Balinguay.

Yngula—; *Tamil:* Panambuvalli—; *Telugu:* Poyinadiputatige, Vanachandra—; *Visayan:* Hoag, Huac, Uac—.

JUNCACEAE.

Erect, rarely annual herbs; stems tufted or with a creeping rootstock. Leaves flat, terete, or reduced to sheaths. Flowers in axillary or terminal cymes, 2-sexual, bracteate, green or whitish and membranous, or brown and coriaceous. Perianth inferior, segments 6 in two series, persistent, imbricate. Stamens 6, rarely 3, hypogynous or on the bases of the segments; anthers basifixed. Ovary 1- or 3- celled, style filiform or short, or 0, stigmas 3, filiform; ovules 3 basilar in the 1-celled ovary, or many in the inner angles of the 3-celled, anatropous. Capsule 1-3-celled, loculicidally 3-valved. Seeds erect, testa membranous, often produced at each end; albumen dense; embryo small, next the hilum.—Genera 8. Species 300.—In damp and cold places, temperate, arctic and tropical mountains.

Some of the members exhibit sedative and diuretic properties.

LUZULA DC.

Leaves grass-like, hairy. Perianth-segments glumaceous. Stamens 3 or 6. Ovary 1-celled, 3-ovuled.—Species 65.—Temperate. chiefly Old World.

L. campestris DC. var. *capitata* Miq. is used medicinally in China.

1. **Luzula campestris** DC Fl. France III, 161; Reichb. Ic. Fl. Germ. IX, t. 375, 376.

Perennial, 15-45 cm. high. Leaves 4-8 mm. broad, glabrous or ciliate. Cyme subumbellately branched, branches of cyme very unequal 6-13 mm.; flowers in peduncled capitate clusters; bracts very short, scarious; heads 6-8 mm. diam. Flowers sessile. Sepals 2-2.5 mm. long, pale or dark brown, ovate-lanceolate, acuminate.

Stamens 6. Capsules shorter than the sepals, broadly oblong or subglobose, obtuse or mucronate. Testa apiculate at the tip, caruncled at the base.

Distribution: Temperate and alpine Himalaya, 10,000—14,000 ft. from Kashmir eastwards, Khasia Mts., Nilgiris, Anamalai Hills 5,000—7,000 ft.—N. temperate regions.

The rhizome is diuretic.

English: Blackcaps, Black-head Grass, Chimney-sweeps, Crow-feet, Cuckoo-grass, Davie-drap, Field Wood Rush, God's Grace, Good Friday Grass, Hair-beard, Meadow Wood Rush, Smuts, Sweeps, Sweep's Brushes, Sweet Bent—.

PALMAE.

Shrubs or trees, solitary or gregarious, naked or prickly; stem erect, scandent or decumbent, rarely branched above. Leaves alternate, usually crowded at the apex of the stem, plicate in bud, pinnatisect or palmate, rarely entire or 2-pinnatisect; petiole sheathing. Flowers small, hermaphrodite or 1-sexual, usually 3-bracteolate, in branched spikes or panicles, enclosed in one or more large sheathing spathes. Perianth inferior, 2-seriate; segments in each series 3, usually all free, imbricate or valvate. Stamens usually 6, inserted in 2 series opposite the perianth-segments, sometimes 3 opposite the outer series of segments, occasionally many at the base of the perianth, usually included; filaments free or connate, subulate or filiform (rarely flattened); anthers versatile, 2-celled; dehiscence lateral or extrorse. Ovary 1-3-celled or of 3 one-celled carpels; ovules in each carpel 1-2, anatropous, adnate to the wall, base, or top of the cell; stigmas 3, usually sessile. Fruit a 1-3-celled drupe or hard berry, or of 1-3 carpels; pericarp smooth or rough, or clothed with downward-imbricating; shining scales. Seeds erect or laterally attached, rarely pendulous; raphe usually branching all over the testa; albumen horny or bony, uniform or ruminate; embryo small, in a cavity near the surface of the albumen.—Genera 200. Species about 1,500.—Tropical and subtropical.

A. Leaves pinnatisect, leaflets free with reduplicate sides or confluent as a plaited limb. Flowers monoecious or dioecious
  1. Male flowers minute, solitary or binate towards the tips of the branches, 3- or 6- androus; female larger, solitary ...... ARECA.
  2. Male flower one on each side of a female, stamens 6 or more .... PINANGA.
  3. Male flowers 9-12-androus, female petals with valvate tips .... LOXOCOCCUS.
  4. Male calyx tubular. Stamens 6. Albumen equable .... WALLICHIA.
  5. Male sepals 3. Stamens many. Albumen equable .... ARENGA.
  6. Male sepals 3. Stamens many. Albumen ruminate .... CARYOTA.
  7. Male flower in catkin-like branches of a drooping androgynous spadix; female capitate at the apex of the spadix ...... NIPA.

B. Leaves pinnatisect; leaflets with induplicate sides. Spadices interfoliar; spathe solitary. Flowers dioecious .... PHOENIX.

C. Leaves flabelliform, orbicular or cuneiform. Spadices interfoliar; spathes many. Flowers usually basexual
  1. Ovary 3-lobed. Style short. Stigma in the fruit basal. Embryo apical .... CORYPHA.
  2: Ovary 3-celled. Style subulate. Stigma in the fruit basal. Embryo dorsal ...., NANNORHOPS.
  3. Berry with a soft membranous endocarp. Albumen deeply ruminate .... COPERNICIA.

D. Leaves pinnatisect. Leaflets with reduplicate sides. Spathes usually many. Fruit clothed with reflexed shining closely imbricating scales
  Stem elongate. Leaflets acuminate, quite entire, nerves parallel. Spathes tubular, persistent .... CALAMUS.

E. Leaves flabelliform. Spadices interfoliar; spathes numerous, sheahing. Flowers dioecious; males minute, sunk in the cavities of the catkin-like branches
  1. Stamens 6. Fruit mostly with 3 stones. Seeds sinuate .... BORASSUS.
  2. Stamens 8. Fruit generally with 1 bilobed kidney-shaped stone. Seeds bilobed .... LODOICEA.
  3. Fruit obovoid, terete or trigonous, 1-seeded .... COCOS.
  4. Fruit ovoid or obovoid, 1-3-seeded. Pericarp spongy and oily .... ELAEIS.

Nutrient, emollient, bechic, and astringent.

Alkaloids—arecaidine, arecolidine, arecoline, guvacine, guvacoline—have been obtained from *Areca catechu* Linn.

OFFICIAL:—Arecoline hydrobromide (France, Germany, Spain, Turkey).

Areca Catechu Linn. in Germany, Sweden, Switzerland.

Calamus Draco Willd. (*Palmijuncus Draco* Rumph.) in Portugal.

Cocos nucifera Linn. in Holland and Portugal.

Daemonorops Draco Blume (Calamus Draco Willdenow) in Spain.

Elaeis guineensis Jacq. (*Palma Avoira* Aubl.) in Portugal.

Phoenix dactylifera Linn. (*P. excelsior* Cavanilles) in Portugal.

Sagus laevis Rumph. (*Metroxylon Sagus* Rottboell) and *S. Rumphii* Willd. (*M. Rumphii* Mart.) in Portugal.

ARECA Linn.

Stem erect, smooth, green in the upper portion, annulate. Leaves pinnate; base of petiole expanding into a smooth, green, amplexicaul sheath; leaflets thin, often confluent, with several midribs, attached to the rhachis in a vertical line. Spadix androgynous, below the leaves, branched, bearing numerous close-set spikes; spathes several. Male flowers many, minute, occupying the upper portion of the spikes; sepals small; petals much longer, obliquely lanceolate, valvate; stamens 3 or 6; filaments short; anthers basifixed, erect. Female flowers much larger, few at the base of the spikes; perianth accrescent; sepals and petals orbicular, imbricate, the petals with acute valvate tips; ovary 1-celled; stigmas 3, sessile; ovule 1, basal, erect. Fruit ovoid or oblong, supported by the persistent perianth; mesocarp fibrous. Seed with a truncate base; endosperm deeply ruminate; embryo; basilar.—Species about 40.—Tropical Asia and Australia.

1. Fruit 3.8-5 cm. diam., smooth, orange or scarlet .... 1. *A. catechu.*
2. Fruit 2.5 cm. narrowly obovoid .... 2. *A. nagensis.*

The nut of *A. catechu* Linn. is used as an astringent, stimulant and anthelmintic in China, Indo China, the Malay Archipelago, Australia, Melanesia, Polynesia, the West Indies, Madagascar, La Reunion, and Guiana.

Several alkaloids—arecaidine, arecaine, arecolidine, arecoline, guvacine, guvacoline—have been isolated from the nut of *A. catechu.*

The nut of *A. Catechu* Linn. is officinal in Germany, Sweden, and Switzerland.

1. **Areca catechu** Linn. Sp. Pl. 1189.—PLATE 986.

Trunk solitary, quite straight, 12-30 m. high, usually about 50 cm. in circumference, uniformly thick. Leaves 1.2-1.8 m., leaflets numerous, 30-60 cm., upper confluent, glabrous. Spathe double, compressed glabrous. Spadix much branched, bearing male and female flowers. Rhachis stout, compressed; branches with filiform tips. Male flowers very numerous, sessile, without bracts; calyx 1-leaved, small, 3-cornered, 3-parted; petals 3, oblong, rigid, striated; stamens 6, anthers sagittate. Female flowers solitary, or 2 or 3, at or near the base of each ramification of the spadix, sessile, without bracts; sepals 3, cordate, rigid, fleshy, permanent; petals 3, like the sepals, permanent; staminodes 6, connate; style scarcely any; stigma 3, short, triangular. Fruit 3.8-5 cm. long, smooth, orange or scarlet.

Distribution: Exact native country uncertain.—Indo-Malaya.

The unripe fruit is poisonous and harmful to the eyesight.—The fruit is bitter, dry; cooling, indigestible; laxative; improves the appetite and test; removes foul breath.—The gum is pungent, saltish; cooling; causes biliousness (Ayurveda).

The nut is digestive, astringent, diuretic, cardiotonic. emmenagogue; useful for inflammation of the eyes, giddiness, gleet; removes pus (Yunani).

The powdered nut, in doses of 10 or 15 grains every three or four hours, is useful in checking diarrhœa arising from debility. It has also been found very useful in urinary disorders, and is reported to possess aphrodisiac properties. The dried nuts, when chewed, produce stimulant and exhilarant effects on the system.

The nut is regarded as a nervine tonic and emmenagogue, and is used as an astringent lotion for the eyes.

The young nut possesses decided astringent properties, and is prescribed in bowel complaints and bad ulcers.

The juice of the young tender leaves mixed with oil is applied as an embrocation in cases of lumbago, and a decoction of the root is a reputed cure for sore lips.

The nut is used as an astringent for bleeding gums; women employ it both internally and locally for stopping watery discharges from the vagina

The grated nut is given as an anthelmintic for round as well as tape worms.

In Ceylon, the nut is scraped and applied externally to ulcers. It is said to strengthen the gums; and it is also given for worms in animals.

In Malaya, the green fruit in its unripe state is sometimes used as a poison in combination with opium. Malay women use the young green shoots as an abortifacient in early pregnancy.

In China, the nuts are used for their tonic, astringent and anthelmintic properties.

In some parts of China the nuts, bruised and powdered, are mixed with the green food given to horses, and they are thus considered a preventive against diarrhœa. In the north of China, small pieces of the nut are boiled and the decoction is taken as a domestic remedy in various visceral affections.

In Cambodia, the leaves are used internally for bronchitis and externally for lumbago, the fruit is given in diarrhœa in combination with opium, and the root is prescribed in diseases of the liver.

The juice of the tender nuts acts in small doses as a laxative (Koman).

The nut has no anthelmintic value (Caius and Mhaskar). It is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Amboina: Buah, Puah—; *Andamans:* Ahbuddah, Ahpurruddah—; *Annam:* Cay cau, Cay cau gia—; *Arabic:* Fofal, Fufal,—; *Assam:* Tambul—; *Banda:* Pua—; *Bengal:* Gua, Supari—; *Burma:* Kun, Kunsi, Kuntheebin, Kwamtheebeng—; *Cagayan:* Bua—; *Cambodia:* Dom sla, Sla—; *Canarese:* Adake, Adaki, Adike, Betta, Bettadike, Bette, Chikaniyadike, Chikke, Gotadike, Kaungu, Khhapura, Poga, Puga, Pugiphala, Tambula—; *Caniarines:* Banga—; *Cantonese:* Pan Long—; *Chinese:* Ping Lang—; *Deccan:* Supari, Supyari—; *Dutch:* Arecapalmboom, Pinang—; *English:* Areca Nut Palm, Areca Palm, Betel Nut Palm, Betel Nut Tree, Betel Palm, Cashoo Nut Tree, Catechu Palm, Catechu Tree, Drunken Date Tree, Fasel Nut, Fauselnut

Tree, Medicinal Cabbage Tree, Indian Nut Tree, Pinang Palm, Supari Palm—; *French:* Arec, Arec bétel, Arec cachou, Arec de l'Inde, Areque, Arequier, Pinangue—; *French Guiana:* Arec—; *German:* Arecapalme, Arekapalme, Betelnusspalme, Betelpalme, Catechupalme, Katechupalme, Kaupalme, Pinangpalme—; *Guam:* Pugua—; *Gujerati:* Hopari, Phophal, Sopari—; *Hindi:* Supari, Suppari, Supyari—; *Ilocano:* Boa—; *Italian:* Areca—; *Java:* Bhunghana-penang, Jambe, Jebug—; *Konkani:* Fufal, Maddi, Supari—; *Laos:* Kok mak—; *La Reunion:* Arec, Pak—; *Malay:* Pinang—; *Malaya:* Chiniping—; *Malayalam:* Atekka, Chempalukka, Ghhonta, Kalunnu, Kamuka, Kavunnu, Kazhangu, Khhapuram, Kramukam, Pakka, Pugam—; *Marathi:* Pophali, Pung, Supari—; *Mundari:* Kasaili-daru—; *New Britain:* Bue—; *Pampangan:* Luyos—; *Pelew Islands:* Bua—; *Persian:* Girdchob, Popal, Pupal—; *Philippines:* Bongapalo, Bongasantol, Lugos, Mangupod—; *Porebunder:* Hopari—; *Portuguese:* Areca, Arequeira—; *Russian:* Areka, Kapustnaya palma—; *Sanskrit:* Akota, Chhataphala, Chikkana, Dirghapadapa, Dridhavalkala, Ghonta, Gopadala, Guvaka, Kapitana, Karamatta, Khapura, Kramuka, Puga, Pugi, Rajatala, Suranjana, Tambula, Tantusara, Valkataru—; *Sinhalese:* Puvakka, Puwak—; *Solomon Islands:* Boa—; *Spanish:* Arequiero—; *Swedish:* Areka—; *Tagalog:* Bonga, Bongang-matulis, Bunga, Mangipod, Sacsic—; *Tamil:* Kamugu, Kandi, Kiramugam, Kugagam, Pakku, Pakkuppanai, Pugam, Tuvarkkay—; *Telugu:* Chikinamu, Chikini, Gautupoka, Khapuramu, Kolapoka, Kramukamu, Oppulu, Oppuvakkulu, Poka, Prakka, Pugamu, Vakka—; *Tulu:* Kangu—; *Urdu:* Supari—; *Uriya:* Gua, Pugo, Supari, Trinodrumo—; *Visayan:* Bonga—.

2. **Areca nagensis** Griff. in Calc. Journ. Nat. Hist. V, 156

This species is not well known.

The trunk rises from 9-12 m. high and is attached to the soil by innumerable black fibrous roots. The leaf stalk is naked for about 90 cm. the blade measuring about 1.2 m. "Pinnules sub-opposite or alternate, falcate, very acuminate, 48 or 50 cm. long, about 3.8 cm. broad, above with 2 or 3 stout keels; the terminal one deeply bilobed, variously partite, the laciniae or divisions bidentate;

the less divided broader part is obliquely truncate with irregular teeth." To this description Griffith has added the note: "The leaves may be open to doubt, from their resemblance to those of Areca gracilis." The spadix measures about 30 cm.; the compressed peduncle is divided from near the base into stout flexuose branches. The female flowers are on the lower parts of the branches, each with a scale-shaped bract. "Sepals round, oblong, obtuse; petals larger, subcordate with a short obtuse cuspis. Fruit oblong-ovate, 2.5 cm. long and 10 mm. wide, attenuated to both ends, base surrounded by the perianth, apex rostrate-mammillate, truncate, with a small mammilla in the centre; fibres numerous, stout, whitish. Seed erect, ovate, 13 mm. long, marked with many veins arising from the hilum, these are generally dichotomous, anastomosing reticulately on the dorsal face. Albumen cartilaginous, horny, ruminate, opaque white. Embryo basilar." (Griffith).

Distribution: Naga Hills, up to 800 ft.

The Nagas and Abors use it as a substitute for the betel-nut.

Naga: Talpat—; *Singpho:* Tongtau—.

Loxococcus Wendl. & Drude.

Trunk tall, erect, cylindric, annulate. Leaves pinnatisect, leaflets linear, obliquely truncate, reduplicate-plicate. Spathes 2, cymbiform. Spadix infrafoliar, monoecious, branched. Flowers ternate, mostly in clusters of a female between 2 males spirally arranged round the branches. Male flowers: sepals 3, orbicular, imbricate; petals 3, much larger, ovate, valvate; stamens 9-12; filaments very short; anthers subversatile, pistillode minute, ovoid. Female flowers smaller than the male, subglobose; sepals orbicular, broadly imbricate, persistent; petals ovate, broadly imbricate, tips valvate, staminodes obsolete; ovary 1-celled, stigmas 3, minute, ovule parietal. Fruit subglobose, cuspidately beaked; stigmas terminal; endosperm ruminate; embryo subbasilar.—Species 1.—Ceylon.

1. **Loxococcus rupicola** Wendl. & Drude in Linnaea XXXIX (1875) 185; Bot. Mag. t. 6358.

Trunk 9-12 m. high, 10-12.5 cm. diam., dull green, base swollen, soboliferous. Leaves about 10, 1.8-2.4 m. long, 0.9-1.2 m. broad, spreading; petiole 30-45 cm. long with a short green sheathing base; leaflets 12-20 pairs, rather distant, spreading and decurved, sessile, linear, tip obliquely truncate and notched, bright green above, glaucous and sparsely furfuraceous beneath, terminal one or two pairs confluent. Lower spathe 30 cm. long, narrowly cymbiform, coriaceous, pale brown, dotted with peltate furfuraceous scales. Spadix 30 cm. long, triangular in outline, coral red, quite smooth; peduncle short, stout, annulate; branches erecto-patent. Flowers blood-red, male flowers about 13 mm. diam.; filaments stout, equalling the linear anthers, pistilode minute, trifid. Female flowers ovoid; ovary obliquely ovoid; ovule pendulous. Fruit about 2 cm. diam., smooth, blood-red; sarcocarp fibrous.

Distribution: Endemic in Ceylon.

The seed is used for mastication with betel, like that of the Arecas.

Ceylon: Dotalu.

PINANGA Bl.

Unarmed; stem erect, annulate. Leaves pinnate, with the upper leaflets confluent. Flowers monoecious, androgynous, ternate, 1 female between 2 males, the clusters in 2 or 4 or 6 series on spadices from the stem below the leaves; spathe solitary. Male flowers obliquely 3-quetrous; sepals 3, acute, keeled, not imbricate; petals 3, ovate or lanceolate valvate; stamens 6 or more; anthers subsessile, basifixed, erect. Female flowers much smaller than the males, ovoid or globose; sepals 3, orbicular, imbricate; petals 3, orbicular, broadly imbricate; ovary 1-celled; stigmas 3; ovule basilar, erect. Fruit ovoid or ellipsoid, pericarp fibrous; seed ovoid or ellipsoid; albumen ruminate; embryo basilar.—Species about 50.—Indo-Malaya.

This genus is therapeutically inert.

1. **Pinanga dicksonii** Bl. Rumph. II, 85.—*Areca dicksonii* Roxb. Fl. Ind. III, 616, Griffith Palms of Brit. Ind. 153, t. 231.

A slender, smooth, green-stemmed palm; stem solitary, tall, 4.8-6 m. high, of about 5 cm. diam., soboliferous. Leaves pinnate, forked, about 1.2 m. long; leaflets numerous, sessile, elongate, 30-60 cm. long and 2-2.5 cm. broad, with numerous parallel veins, apices praemorse, dentate. Spadix retrofracted, compound; ramifications from 4-8, alternate, simple, equal, distichous, from 15-20 cm. long, stout, clothed with imbricating flowers. Spathe simple rigid, compressed. Male flowers: Calyx 3-cleft, divisions subulate, nearly as long as the corolla; petals 3, ovate, cordate, valvate, tapering at the tips. Stamens from 20-30; filaments very short; anthers linear; pistillode 0. Female flowers: Spathes 3, reniform; corolla like the calyx; staminodes 6, clavate, penicillate; style short; stigma 3-lobed. Berry oblong, dry, fibrous, 1.3-2 cm. long by 8 mm. diam. Seed of the shape of the berry, ruminated. Embryo basilar.

Distribution: Mountains of Travancore and Malabar, Gersoppa Falls and Nilkund Ghats of N. Kanara.

The poorer classes use the fruit as a substitute for the betel-nut. *Malayalam:* Kanakamuka—; *Telugu:* Kondapoka—.

ARENGA Labill.

Tall, stout palms, flowering first from an upper leaf-axil and successively from lower; trunk densely clothed above with fibrous remains of the leaf-sheaths. Leaves terminal, long, pinnatisect; leaflets long, linear, usually praemorse with a midrib and numerous longitudinal nerves, and one or two auricles at the base. Spathes many, clothing the peduncle of the spadix. Spadices interfoliar, large, much-branched; branches slender, pendulous; peduncles short, decurved. Male and female flowers usually solitary and on separate spadices, rarely 3-nate, a female between 2 males. Male flowers symmetric; sepals 3, orbicular, imbricate; petals oblong, valvate; stamens numerous; filaments short, anthers apiculate; pistillode 0. Female flowers subglobose; sepals accrescent; petals triangular, valvate; staminodes many or 0; ovary subglobose, 3-celled; stigmas conic. Fruit obovoidly globose, 2-3-seeded; stigmas terminal. Seeds compressed or plano-convex; albumen equable; embryo dorsal.—Species about 10.—Tropical Asia, Malaya, Australia.

1. Leaflets 4-fariously fascicled .... 1. *A. saccharifera.*
2. Leaflets bifarious .... 2. *A. obtusifolia.*

A. engleri Becc. and *A. saccharifera* Labill, are used medicinally by the Chinese, the latter is also used medicinally in Cambodia.

A. obtusifolia Mart. and *A. saccharifera* Labill. are used as poisons by the Malays.

1. **Arenga saccharifera** Labill in Mém. Inst. Fr. IV, 209; Griffith Palms of Brit. Ind. 164, t. 135A.—*Saguerus Rumphii* Roxb. Fl. Ind. III (1832) 626.

A beautiful and magnificent palm, trunk 6-12 m. high, very stout. Crown oblong, very dense, of a sombre aspect, leaves many and large, 6-8.4 m. long and 3 m. broad, outline oblong-ovate, petiole very stout, channelled at the base, sprinkled with blackish scurf; leaflets up to 115 on each side, 0.9-1.5 m. long, subsessile, linear, 4-5-fariously fascicled, coriaceous, variously toothed towards the tip, base 1-2-auricled, dark-green above, white beneath, costa stout, scurfy beneath. Spadices several, axillary, 1.8-3 m. long, branched, branches attenuate at the apex, and then furnished with a few rudimentary flowers, slender, pendulous. Male and female flowers together on most branches, one sex generally preponderating. Male flowers very numerous, oblong, club-shaped, of a rich purple black colour and a disagreeable smell, of considerable size, often 2.5 cm. long; sepals 3, rounded, broad, imbricate; petals nearly 3 times as long, oblong, valvate; stamens numerous; filaments short, slender; anthers nearly as long as the petals, apiculate; pistillode 0. Female flowers solitary, large, 2.5 cm. diam. Sepals 3, very broad; petals 3, cordate-ovate, coriaceous. Staminodes 0; ovary shortly obturbinate, 3-celled, apex 3-lobed, concave in the centre; stigmas 3, tooth-shaped, triangular, erect; down the back of those lobes that are opposite the sepals runs a slight keel. Fruit 5-6.3 cm. long, oblong-turbinate, surrounded at the base by the perianth, apex flat or nearly concave, marked with 3 lines, running from the backs of the persistent stigmas to the now nearly obsolete lobes; outer substance coriaceous, thick, inner gelatinous, adhering for the most part to the seeds; seeds black, convex on the outer, bifacial on the inner face, attenuate at the base; albumen horny, cartilaginous; embryo dorsal.

Distribution: Assam, Martaban, Tenasserim. Commonly cultivated in India.—Malay Peninsula and Archipelago.

The root is considered pectoral in Cambodia, and administered in bronchitis. It is also said to be stomachic. The plant is often used as a substitute for *Borassus flabellifer*.

The juice of the fleshy outer covering of the fruit is highly stimulating and corrosive. If applied to the skin it causes great pain and inflammation. It is used by Malays to poison their enemies.

Burma: Taungong, Toungong—; *Cambodia:* Thnotnhi—; *Chinese:* So Mu Mien—; *Dutch:* Aren, Arenboom, Sreng, Arengboom, Arengpalm, Arenpalm, Gamoetoeboom, Gomoetipalm, Gomoetoepalm, Sagoeweerpalm, Sagueerboom, Sagueerpalm, Saguweerpalm, Suikerboom—; *English:* Areng Palm, Gomuti Palm, Malay Sago Palm, Sago Palm, Sugar Palm—; *French:* Anou, Arbre au sagou, Aren a sucre, Areng, Gomonto, Gomuti, Lantar, Lontar, Palmier areng, Palmier rondier, Palmier a sucre, Rondier—; *German:* Echte Zuckerpalme, Gomutipalme, Sagwirepalme, Zuckerpalme—; *Ilocano:* Ratipan—; *Java:* Aren, Buwah atap, Duk, Kolang Kaling, Lirang—; *Madura Island:* Dhuk, Edhuk—; *Malacca:* Gumuti—; *Malay:* Anan, Berkat, Enau, Kabong—; *Pangasinan:* Anibung—; *Philippines:* Baru—; *Sunda Islands:* Kawung—; *Tagalog:* Cauon, Iroc, Pugahan—; *Tamil:* Kichilippanai, Kumudippanai, Segovarisi—; *Visayan:* Bahi, Hibioc, Hidioc, Ibioc, Idioc—.

2. **Arenga obtusifolia** Mart. Hist. Nat. Palm. III, 191, t. 147, 148-161.—*A. Westerhoutii* Griff. in Calc. Journ. Nat. Hist. V, 474.

Trunk tall, very stout. Leaves ample, linear-oblong in outline, 6 m. long, 3 m. across in the broadest part; leaflets sessile, about 1.5 m. in length, 7.5 cm. broad, alternate or subopposite, solitary, bifarious, very spreading with deflexed points, alternate towards the base, the upper ones along auriculate at the lower side, coriaceous, bright green above, white underneath, together with the petiole scurfy towards the base; margin with irregular spinescent teeth; apex praemorse, dentate and erose, sometimes bilobed. Spadix curved-pendulous. Spathes fibrous, coriaceous, often split. Spikes about level-topped. Male flowers in pairs, without an interposed rudimentary female, or solitary with a rudimentary female; calyx cup-shaped, petals oblong, fuscous-purple. Stamens numerous; filaments short, subulate; anthers with mucronate or aristate ends. Pollen hispid, with a longitudinal fold. Female flowers solitary, sessile, sepals broad, petals 3, cordate, concave, obtusely carinate; ovary roundish, trigonal, depressed at the apex, and there marked with 3 lines running from the angles to the stigma, which are 3 in number, tooth-shaped, and connivent so as to form a cone. Fruit roundish, about the size of a small appel, with a depressed 3-lobed, trigonal vertex, terminated by the sphacelated stigmas, surrounded at the base by the perianth, 2-3-celled; outer substance thick, fibrous-fleshy. Seed separating with the thick gelatinous cellular endocarp, of black colour; when 3, convex-bifacial; embryo oblique, in the centre of the dorsal face of the horny albumen.

Distribution: Malay Peninsula. Cultivated in India.

The juice obtained from the fruit is used by the Malays to poison their enemies. In the Philippine Islands, it is used for poisoning fish.

Malacca: Anooee kutaree—; *Malay:* Langkap—; *Penang:* Langkab—.

WALLICHIA Roxb.

Stemless or caulescent, rarely simple-stemmed, often soboliferous palms. Leaves pinnatisect; leaflets linear or oblong, irregularly toothed, base cuneate, unicostate, nerves flabellate. Spathes many, tubular, clothing the peduncle, of the spadix, upper large cymbiform. Spadices interfoliar, monoecious or polygamous; males ovoid, excessively branched and dense-flowered; female looser-flowered. Male flowers symmetric, calyx cylindric or cupular, membranous, truncate; corolla cylindric, deeply 3-lobed, lobes oblong, valvate; stamens 6 on the corolla-tube; filaments short, anthers large;

pistillode 0. Female flowers much smaller, subglobose, sepals orbicular, coriaceous, imbricate, petals triangular, valvate, staminodes few or 0, ovary 2-3-celled, stipitate; stigmas conic, ovules subbasilar. —Fruit ovoid-oblong, 1-3- celled and -seeded. Seeds erect, plano-convex, albumen equable; embryo dorsal, conical.—Species about 3. —Indo-Malaya.

The genus is therapeutically inert.

1. **Wallichia disticha** T. Anders. in Journ. Linn. Soc. XI, 6.

An evergreen simple-stemmed palm; trunk 3-6 m. high, 15-30 cm. diam., naked, annulate. Leaves 2.4-3 m. long, distichous, erect; leaflets narrowing from near the truncate apex to the base and with a large tooth on each side about the middle, 30-60 cm. long, 5-6.3 cm. broad, glaucous beneath; petiole and sheath short, scurfy. Male spadix 0.9-1.2 m. long, very narrow, linear in outline, with innumerable, recurved, slender, crowded branches. Male calyx cupular, 3-lobed, corolla thrice as long. Female spadix 1.8-2.4 m. long, pendulous; branches stout, simple. Female flowers disposed in many spiral series, green; corolla longer than the ovary. Fruit oblong, top obscurely 2-3-lobed, reddish.

Distribution: Oudh, valleys of Sikkim Himalaya up to 2,000 ft., Assam, Burma.

The berries irritate the skin (Anderson).

Burma (Lower): Letme, Zanaung—; *Burma* (Upper) Minbaw—; *Lepcha:* Katong—.

CARYOTA Linn.

Tall, unarmed, palms with annulate, naked or sheathed trunks, soboliferous or not, flowering when full grown from the axils of the leaves, beginning at the upper and then successively downwards, after which the plant dies, usually a male and a female spadix alternately. Leaves few, very large, broad, bipinnatisect or decompound; leaflets very obliquely dimidiately flabelliform or cuneiform, praemorse or rounded at the tip, their bases swollen at the insertion; nerves and veins flabellate. Spathes 3-5, incomplete, tubular. Spadices interfoliar, shortly peduncled, much fastigiately branched;

branches slender, pendulous. Flowers monoecious, solitary and nude, or ternate with the central flower female. Male flowers symmetric; sepals 3, short, rounded, coriaceous, closely imbricate; petals 3, larger than the sepals, linear-oblong or ovate-oblong, valvate; stamens very many; filaments very short; anthers long; pistillode 0. Female flowers subglobose, smaller than the male; sepals 3, ovate or orbicular, concave, closely imbricate; petals 3, rounded, valvate; ovary obovoid, 3-gonous, 3-celled; ovule in each fertile cell solitary; stigma sessile, 3-lobed; staminodes 3 or 6 or 0. Fruit globose, 1-2- (rarely 3-) seeded, crowned by the stigma; sarcocarp full of raphides. Seed erect; albumen ruminate; embryo dorsal.—Species about 12.—Tropical Asia, Malaya and Australia.

1. Leaves 5.4-6. m. .... 1. *C. urens.*
2. Leaves 1.2-2.7 m. .... 2. *C. mitis.*

C. mitis Lour. is used medicinally in Cambodia and as a poison in Malaya.

1. **Caryota urens** Linn. Fl. Zeyl. 187.—PLATE 986A.

Trunk 12-18 m. high, 30-45 cm. diam.; cylindric, annulate, not or scarcely soboliferous, smooth, grey, shining, covered with long, shallow cracks with corky edges. The crown is rather thin, consisting of several ascending, gracefully curved bipinnate leaves, of great size, being 5.4-6 m. long and 3-4.5 m. broad; the primary divisions 1.5-1.8 m. long, arched and drooping; leaflets 10-20 cm. long, fasciculate or alternate, cuneiform, obliquely truncate, irregularly serrate-toothed on the truncate margin, the upper margin produced beyond the leaflets into a tail, flabellately veined, glabrous, bright green, shining, the margins at the base recurved. Petiole very stout, at the base measuring about 7.5 cm. across, the lower foot in its length is naked, and the margins of the sheath continued upon it as an elevated, confluent line. Rete moderate and coarsely fibrous. Spadix very large, 3-3.6 m. long. Peduncle curved, stout, entirely covered with large, greyish, coriaceous spathes, 30-45 cm. long, and closely imbricated; branches simple, very long, pendulous, level-topped, resembling a huge, docked horse-tail. Flowers very numerous, placed in threes, the central and lowermost being female, and later than the others in development. Male flowers: Buds narrowly cylindric, 13 mm. long; sepals 3, roundish, cordate, ciliate imbricate; petals coriaceous, concave, reddish; stamens about 40; filaments short, white; anthers about as long as the petals, linear, acuminate; pistillode 0. Female flowers much the same as the male, but the sepals broader, more ciliate, the corolla shorter, and of greenish colour; staminodes usually 3, placed opposite the sepals and angles of the ovarium, resembling young anthers. Ovary subtrigonal, roundish, 3-locular; ovule solitary, erect; stigma sessile, 3-lobed. Fruit 1.7-2 cm. diam., reddish; pericarp thin, yellow, acrid; seeds one or two; albumen ruminate, embryo dorsal.

Distribution: All over India.

The nut is acrid, cooling; allay thirst and fatigue; causes "kapha", biliousness, flatulence (Ayurveda).

A glass of the freshly-drawn toddy, taken early in the morning, acts as a laxative.

The nut is used as an application to the head in cases of hemicrania.

Assam: Baraflawar—; *Bombay:* Birlimhad, Birlimhar—; *Burma:* Kimbo, Minbaw, Minbo—; *Canarese:* Bagani, Baini, Bayne—; *Deccan:* Marikajhar—; *Dutch:* Jagerieboom, Nieboom, Sagueerboom, Wilde Sagueerboom—; *English:* Bastard Sago Palm, East Indian Wine Palm, Elephant's Palm, Fish-tail Palm, Ghaut Palm, Hill Palm, Indian Sago Palm, Jaggery Palm, Kittul Tree, Malabar Sago Palm, Mhar Palm, Toddy Palm, Wine Palm—; *French:* Caryote brulant, Faux sagonier de l'Inde, Palmier céleri—; *German:* Bastardsagopalme, Ostindische, Brennpalme, Sagopalme—; *Gujerati:* Shankarjata, Shivajata—; *Hindi:* Mari, Marikajhad—; *Khond:* Sarta—; *Konkani:* Birlamadd, Birlimad—; *Lepcha:* Runbong, Simong, Somong—; *Magahi:* Hlyamban—; *Malayalam:* Anappana, Chundapana, Chuntappana, Irampana, Kalapana, Vainavu—; *Marathi:* Ardhimpari Ardhisupari, Berli, Berlimad, Berlimada, Berlimhar, Bherawa, Bherlamuda, Bherlimad, Bhirlimahad, Birli, Mad—; *Nepal:* Ranbhang—; *Philippines:* Cabonegro, Sagu, Taguipan—; *Porebunder:* Mervajata—; *Portuguese:* Palmeira brava—; *Sanskrit:* Dhoajavriksha, Dirgha, Mada, Madadruma, Madyadru, Madyadruma, Mohakari, Rajju, Vitanaka—; *Saora:* Jivalaggu—; *Sinhalese:* Kittul, Nepora—; *Tagalog:* Pugahan, Taquipan—; *Tamil:* Adam, Irambanai, Kondapauni, Kundarbanai, Pugam, Talam, Thippali Tippilippanai, Udalarbanan—; *Telugu:* Bakini, Jivalaggu, Kondajivalaggu, Jiluga, Mare, Yatrakatari—; *Tulu:* Indu, Kannida—; *Uriya:* Modhura, Solopo—.

2. **Caryota mitis** Lour. Fl. Cochinch. II, 569.

A very elegant palm, stem 3.6-12 m. high, 10-12.5 cm. diam., soboliferous, forming very thick, compact tufts, greenish, distinctly annulate. Petioles, leaf-sheaths and spathes scurfily villous. Leaves 1.2-2.7 m. long, spreading, nodding towards the apex, glaucescent, greenish; leaflets 10-18 cm. long, very obliquely cuneiform erose and toothed, the upper margin acute, regularly and rather obtusely jagged. Spathes concealing the whole peduncle, almost boat-shaped, at length deciduous. Branches of spadix very numerous, about 30 cm. long, the whole resembling the spadix of *C. urens,* but much smaller, with fewer unequal scurfy branches and much smaller flowers. Male flowers very numerous, about 6 mm. long, oblong, flesh-coloured, with reddish points; calyx cup-shaped, sepals broad, imbricate; petals 3, coriaceous, striate, almost distinct; stamens many, filaments very short, united at the base; anthers linear, adnate, generally slightly mucronate; pollen ovate-lanceolate, 1- or 3- plicate. Female flowers at the time of expansion of the males minute, rudimentary, not developed until after the males of the same spadix have fallen off, smaller than the males, not always solitary, but sometimes 2 or 3 together, or solitary with a scar of one male only; sepals rounded, with a brown intramarginal line, and ciliate edges; petals 3, twice as long as the sepals, valvate, coriaceous, brown; staminodes 3, yellowish, tips glandular; ovary roundish ovate, with 3 obtuse angles. Fruit 13 mm. diam., red, surrounded at the base by the perianth, depressed, rather round; epicarp brittle, subfibrous. Seed globose; albumen horny, ruminate; embryo dorsal.

Distribution: Burma, Martaban, Malay Peninsula.—Penang, Andaman Islands, Malay Archipelago.

In Cambodia, the soft fibres found at the base of the leaf-sheath are used in the cauterization of wounds.

In Malaya, the fruit is put into wells with intent to cause annoyance. Bathing with well water that has been treated in this way gives rise to an intense itching of the skin, and may cause an acute inflammation of the eyes. The fresh juice of the fruit when applied directly to the skin is extremely irritating.

In Kelantan, the juice of the fruit, mixed with bamboo hairs and an extract of toad, is considered very poisonous.

Cambodia: Anse—; *Malay:* Beredin, Dudok, Meredin, Tukkus—; *Penang:* Dudur—.

PHOENIX Linn.

Tall trees or low shrubs, the entire stem of the upper portion only closely covered by the more or less rhomboid bases of the petioles; stems occasionally branched. The first leaf of the seedling, and sometimes the first leaf of root-suckers is lanceolate. entire. Leaves pinnate; leaflets entire, linear, folded longitudinally and attached obliquely with their folded base to the common woody petiole, the lowest pinnae usually transformed into spines; no midrib but a slender nerve on either side of the fold; nerves longitudinal, parallel, stout and slender, the slender nerves often obscure; transverse veinlets present, but usually only visible under the microscope in thin sections, cut parallel with the surface of the leaf. In the majority of species the leaflets in the lower portion of the petiole stand in fascicles of 4 or 6, 2 or 3 on each side of the petiole, while the upper leaflets are usually alternate or opposite; common petiole semiterete or flat, often widening at the base into a sheath, which frequently expands into a mass of tough, reticulate fibres. Flowers dioecious, small, yellowish, coriaceous, sessile on the bends of long, glabrous, undulating spikelets, usually supported by 1 or 2 minute, subulate, or triangular bracts, the female flowers often approximate in pairs. The spikelets are inserted in horizontal or oblique lines on both sides of a flat, woody peduncle. Male flowers: Sepals 3, connate in a cupular 3-toothed calyx. Petals 3, obliquely ovate, valvate. Stamens 6; filaments short, subulate; anthers erect, dorsifixed; pistilode minute or absent. Female flowers; Sepals 3, connate in a globose, accrescent calyx. Petals 3, rounded, imbricate; staminodes 6, free or connate in a 6-toothed cup. Carpels 3, free; ovules erect; stigmas sessile, hooked. Peduncle often lengthening after flowering. Fruit a single, oblong, 1-seeded berry, with a terminal stigma, a fleshy pericarp, and a membranous endocarp; seed oblong, ventrally grooved; albumen uniform or subruminate; embryo small.—Species about 12.—Africa, Asia.

1. Leaves 2.1-3.6 m. .... 2. *P. sylvestris.*
2. Leaves longer than in the preceding species .... 1. *P. dactylifera.*
3. Leaves 0.9-1.5 m. long. .... 3. *P. pusilla.*

P. dactylifera Linn. is used medicinally in China.

The fruit of *P. dactylifera* Linn. (*P. excelsior Cavanilles*) is officinal in Portugal.

1. **Phoenix dactylifera** Linn. Hort. Cliff. 482.—PLATE 987B.

A tall tree, attaining 30-36 m.; trunk covered with the persistent bases of petioles; the foot often surrounded by a dense mass of root-suckers which is never the case in P. sylvestris. Leaves grey, longer than those of P. sylvestris; pinnae 20-40 cm. long, regularly distichous, forming a very acute angle with the petiole, often approximate in twos or threes on the same side of the petiole; petiole grey, laterally compressed, almost flat. Male panicles white, compact, 15-23 cm. long, on a short peduncle, flowers 6-8 mm. long, sweet-scented; sheaths outside with rusty down. Peduncles of female inflorescence 8-13 mm. broad, sometimes broader below, spikes 30-60 cm. long. Fruit oblong, 2.5-7.5 cm. long, generally reddish or yellowish brown when ripe, pulp fleshy, sweet; numerous varieties are cultivated, differing in colour, shape, and taste of the fruit. Seed cylindric, with a longitudinal furrow in front, and a small cylindric, embryo in the middle of the rounded back.

Distribution: Cultivated and self-sown in Sind, S. Punjab.—W. Asia, N. Africa, Spain, Italy, Sicily, Greece.

The fruit is sweet, cooling; tonic, fattening, aphrodisiac, alexiteric; useful in leprosy, thirst, asthma, bronchitis, fatigue, tuberculosis, abdominal complaints, fevers, vomiting, wandering of the mind, loss of consciousness.—The toddy is intoxicating, fattening, aphrodisiac; improves taste; useful in bronchitis and "vata"; causes biliousness (Ayurveda).

The leaves are aphrodisiac; good for the liver.—The flower is bitter; purgative, expectorant, tonic to the liver; useful in fever and blood complaints.—The fruit is aphrodisiac, tonic; strengthens the kidney; enriches the blood; useful in paralysis, chest, and lung complaints.—The dry fruit is sweet, diuretic, aphrodisiac, enriches the blood; useful in bronchitis.—The seed is applied to wounds; lessens inflammation (Yunani).

Dates are considered demulcent, expectorant, laxative, nutrient and aphrodisiac. They are prescribed in cases of cough, asthma and other chest complaints; also in fever, gonorrhœa, &c. The gum is esteemed as a useful remedy in diarrhœa and diseases of the genito-urinary system. Long-continued use of the fruit is said to produce soreness of the gums.

The natives of South India make a paste of the seeds by trituration with water, and apply it over the eyelids for opacity of the cornea. The fresh juice is cooling and laxative. In the cold season, when the juice does not undergo fermentation, it is an excellent medicine.

Arabic: Nakhleh—; *Badaga:* Gajjira—; *Bengal:* Khajur—; *Bhote:* Kasser—; *Bombay:* Khajur—; *Burma:* Sunbalun, Swonpalwon—; *Canarese:* Kajura, Karika, Karjura, Kharjura—; *Chinese:* Wu Lou Tzu—; *English:* Arabian Date Palm, Cultivated Date Palm, Edible Date, Large Date, Persian Date—; *French:* Dattier, Dattier cultivé—; *German:* Dattelbaum, Dattelpalme—; *Greek:* Phoinix—; *Gujerati:* Karek, Khajur—; *Hebrew:* Chhomer, Tomer—; *Hindi:* Khaji, Khajur—; *Italian:* Dattero, Palma—; *Kachhi:* Khaji—; *Kej:* Abdandan, Abraughan, Amiri, Anguro, Arrasht, Bambai, Banduk, Barni, Barral, Bingu, Bulediraughani, Burshakri, Buzband, Chafshak, Charpan, Dashtari, Gognai, Gozti, Gundgoreg, Gurbagu, Gwazo, Haleni, Husaini, Jafash, Jafshakjalgi, Jamsaki, Jowanabushmas, Johanajaski, Jozo, Kalerak, Kalunti, Karpaso, Khargi, Khurmazard, Kohijalgi, Kuleri, Kuzanabat, Mairisurkh, Makli, Mataftaza, Mulkijalgi, Nazamdazi, Nazantabaqi, Nazbibilanguk, Naznin, Pandi, Peshnai, Pingu, Pull, Rago, Baughani, Santgwaragh, Shagashkhand, Shipga, Siahkanok, Sohri, Suhrebegamjangi, Tigal, Ushtarkor, Wakhshi, Washkalunt, Washkung, Washnao, Zard—; *Kohhaja:* Mach—; *Malayalam:* Itta, Ittappalam, Tenitta—; *Malta:* Palma, Palma da datteri, Palma tat-tamar—; *Marathi:* Kharjur—; *Nasirabad:* Khajji, Khurma—; *Nushki:* Mach—; *Panjgur:* Begamjangi, Dandari, Dashtlafashsabzo, Fard, Fofo, Haraksabzo, Hussainizard, Joshandakalut, Joshandasabzo, Khurmakarmachi, Khurmaikalut, Kungo, Mozawati, Rabi, Radag, Zardan, Zardpanjguri—; *Portuguese:* Palmeira, Tamareira—; *Punjab:* Khaji, Khajur—; *Pushtu:* Kajura—; *Roumanian:* Curmal—; *Russian:* Phinikovoe dyerevo—; *Sanskrit:* Dipya, Hayabhaksha, Madhurasraoa, Mudarika, Phalapushpa, Pindakharjura, Pindakharjurika, Pindiphala, Rajajambu, Sapinda, Svadupinda—; *Sharig:* Khajur—; *Sibi:* Khajji, Khurma—; *Sind:* Kaji, Kurma, Pindchirdi, Tar—; *Sinhalese:* Indi—; *Spanish:* Datilera, Palma datilera, Palmera—; *Swedish:* Palmtrae—; *Tamil:* Ichu, Inju, Karchuram, Kuravam, Perindu, Perinju, Titti—; *Telugu:* Gajjuramu, Ita, Kharjuramu, Manjiyita, Muddakharjuramu, Peridu, Perita, Simakharjuramu—; *Turki:* Karmah—; *Urdu:* Khurma—; *Uriya:* Khorjjuri—.

2. **Phoenix sylvestris** Roxb. Hort. Beng. (1814) 73.—PLATE 987A.

A very graceful palm, when not injured by extracting toddy, 9-15 m. high. Trunk rough from the persistent bases of the leaf-stalks. Crown hemispherical, very large and thick, leaves 3-4.5 m. long, greyish green, quite glabrous, pinnate; petioles compressed only towards the apex, at the base bearing a few channelled triangular short spines reaching 10 cm. Pinnules very numerous, densely fascicled, 15-45 by 2-2.5 cm. long, glaucous, rigid, ensiform, conduplicate at the base, then canaliculate, subulately acuminated, almost spinous pointed, 2-4-farious, some intermediately spreading, others crossing these above and below in an ascending direction. Male flowers white, scented; spadix 60-90 cm. long, erect; peduncle highly compressed. Spathes of about the same length, very coriaceous, almost woody, scurfy, separating into two boat-shaped valves. Spikes very numerous towards the apex of the peduncle, especially on its anterior face, generally in fascicles and simple, 10-15 cm. long, slender, flexuose. Flowers 6-8 mm. long, very numerous, angular, oblique. Calyx cup-shaped, with 3 short rounded teeth. Petals three or four times longer than the sepals, concave, warty on the outside, on the inside deeply ridged and furrowed. Filaments scarcely any, or very short, free. Anthers linear, adnate, shorter than the petals. Female flowers: Spadix and spathe much the same as in the male. Spikes arranged in distinct groups, 30-34 cm. long, the lower 10-15 cm. not bearing any flowers, flexuose. Flowers distant, roundish. Calyx cup-shaped, obsoletely 3-toothed. Petals 3, very broad, convolutely imbricate, having a small opening at the apex. Staminodes 3-4. Carpels 3, free, erect; ovules solitary; style recurved, inwardly papillose. Fruiting spadix 90 cm. long, nodding at the apex from the weight of the fruit, much compressed, of a golden orange colour. Fruit scattered on long pendulous similarly coloured spikes, 2.5-3.2 cm. long, oblong-ellipsoid, orange-yellow, with a terminal stigma, surrounded at the base by the perianth. Pericarp fleshy, yellow, moderate, very astringent, lined by irregular cellular white tissue, part of which adheres to the thin envelope that separates with the seed. Seed 17 mm. long, rounded at the ends, deeply grooved along its whole length on one side, with a slight incomplete furrow on the other side, in the centre of which is a depression with a mammillate fundus, indicating the position of the embryo. Albumen on a transverse section horse-shoe-shaped.

Distribution: Tolerably common throughout India, wild or more often cultivated.

The fruit is sweet, cooling, oleaginous, cardiotonic, fattening, constipating, aphrodisiac; good in heart complaints, abdominal complaints, fevers, vomiting, wandering of the mind, loss of consciousness (Ayurveda).

The juice obtained from the tree is considered a cooling beverage. The central tender part is used in gonorrhœa and gleet. The root is used in toothache.

The fruit, pounded and mixed with almonds, quince seeds, pistachio nuts, spices and sugar forms a *paushtik*, or restorative remedy, much in vogue. A paste, formed of the kernels with the root of *Achyranthes aspera*, is eaten with betel leaves as a remedy for ague.

Bengal: Kajar, Kejur—; *Berar:* Seindi—; *Bombay:* Khajur, Khajura, Khajuri, Sendi—; *Canarese:* Andadayichalu, Ichal, Ichale, Ichalu, Ichela, Ichil, Kallichalu, Kallu, Siyindu—; *Deccan:* Sandolekanar—; *English:* Date-sugar Palm, Indian Wine Palm, Sugar Palm, Wild Date Palm—; *Gond:* Sindi—; *Gujerati:* Kajuri, Kharak, Tadi—; *Hindi:* Kejur, Khaji, Khajur, Khajuri, Salma, Sendhi, Thakil, Thalma—; *Kolami:* Khajur—; *Konkani:* Kajuri—; *Malayalam:* Inta, Intappana, Kaṭtinta—; *Marathi:* Boichand, Sendri, Shindi, Sindikajuri—; *Mundari:* Darukita, Kitadaru—; *Porebunder:* Khalelananjhad, Tadi—; *Punjab:* Khaji, Khajur—; *Sanskrit:* Bhumikharjurika, Duraroha, Duraruha, Dushpradarsha, Haluka, Haripriya, Kakakarkati, Kapila, Kashayi, Kharju, Kharjuri, Mriduchhada, Nishreni, Skandhappala, Svadi, Svadumastaka, Yavaneshta—; *Santal:* Khijur—; *Sinhalese:* Indi—; *Tamil:* Ichambanai, Inju, Karavam, Kattinju, Madal, Periyayinju—; *Telugu:* Ita, Peddayita—; *Uriya:* Khorjuri, Khorjuro—.

3. **Phoenix pusilla** Gaertn. Fr. I (1788) 24.—*P. farinifera* Roxb. Corom Pl. I, 55, t. 74.

Shrubby; stem very short, stoloniferous, entirely enveloped in the sheaths of the leaves so that it is never seen; the whole appears like a large round bush. Leaves pinnate; petiole with one or more pairs of spines; leaflets subopposite, 4-farious, sword-shaped, much pointed, rigid, smooth, of a pale green. Spathes axillary, one-valved, concave on the inside, this concavity being bordered by two sharp edges, convex on the outside, there splitting longitudinally, leathery, smooth, withering. Spadix 20-30 cm. long, erect, much-branched; branches simple, spreading in all directions. Male flowers: calyx small, slightly 3-toothed; petals 3, oblong, rigid, white. Filaments 6, very short, inserted into a fleshy globular receptacle. Anthers oblong erect. Female flowers not on the same plant; calyx like the calyx of the male flower. Petals 3, orbicular, concave, equal, rigid, lasting.

Ovaries 3, only one increasing in size, ovate, each having a short recurved style. Stigma simple. Ripe berry 13 mm. long, of a dull purple black, of the size of a large French bean; pulp sweet and mealy. Seed cartilaginous, of the shape of the berry, grooved longitudinally, as in the Date, pretty smooth brown outside, light greyish white within, with a small elevation on the middle of the back, under which is an oblong pit containing the embryo.

Distribution: Coromandel Coast not far from the sea, in the Northern part of Ceylon in dry forests.

The fresh juice is cooling and laxative.

The gum is used in diarrhœa, and in genito-urinary diseases.

Canarese: Hullichala, Ichalu, Sannayichalu—; *Ceylon:* Inchu—; *Hindi:* Palawat—; *Malayalam:* Chittintal, Inta—; *Tamil:* Ichu, Indu, Inju, Kalangu, Kurinji, Sagi, Siruyinju, Sittinju—.

NANNORHOPS H. Wendl.

A gregarious, tufted, low-growing, glabrous palm; stems or rhizomes robust, prostrate, branching. Leaves cuneately flabellate, rigid, plicate, split into curved 2-fid segments; petiole short. Spadix axillary (intrafoliar), much-branched; spathes tubular, sheathing, spathels ochreate. Flowers polygamous. Calyx tubular, membranous, unequally 3-lobed. Corolla 3-partite, valvate. Stamens in hermaphrodite flowers 6, in male flowers about 9. Ovary 3-gonous; ovules basilar; style short; stigma 3-toothed. Drupe small, globose or oblong, 1-seeded; style basilar. Seed free, erect, ventrally hollowed, hilum small; albumen uniform; embryo dorsal or subbasilar.—Species 1.—India.—Afghanistan.

1. **Nannorhops ritchieana** H. Wendl. in Bot. Zeit. (1879) 148.—PLATE 988.

A low gregarious shrub, the leaves usually tufted from an underground, much-branched rhizome 2.4-3 m. long, as thick as a man's arm, sometimes from an erect branching stem, reaching 6 m. high. Leaves 60-120 cm. long and broad cuneately flabellate, rigid, plicate, greyish green, consisting of 8-15 linear rigid segments 30-37.5 cm. long, with often interposed fibres, folded, 2-partite; petioles unarmed, 15-30 cm. long; base of petiole without any reticulate inner layer, but with a mass of rust-coloured wool. Flowers polygamous, male and hermaphrodite. Spadix pyramidal; branches ascending and recurved; branchlets slender; branches and branchlets arising from the axils of tubular, membranous, sheathing bracts with prominent, reticulate, longitudinal nerves; branchlets bifarious, with numerous flowers in the axils of turbinate, membranous, sheathing bracts, with a thin membranous edge. All the bracts are closed sheaths, with a short, subulate or triangular apex; they are spirally arranged, though apparently distichous on the principal axis and the main branches. Flowers in pairs in the axils of hyaline bracts, distinct or connate, and bicuspidate. Calyx thinly membranous, flat, 3-toothed. Petals connate at the base. Stamens 6, sometimes 9 in the male flowers, in the male flowers inserted in the corolla-tube, in hermaphrodite flowers in its throat; anthers sagittate, attached at the back above the base to the subulate filaments. Ovary 3-celled, narrowed into the short style. Fruit an ovoid or subglobose 1-seeded drupe, with the rudiments of 2 abortive carpels, supported by the marcescent calyx, petals, and the remains of the filaments, 1.3-2 cm. diam., surface minutely wrinkled; albumen horny, with a central cavity.

Distribution: Sind, Baluchistan, Waziristan, Punjab.—Afghanistan.

The young leaves are given in diarrhœa and dysentery. They are also purgative; chiefly used in veterinary medicine (Bellew).

Bangash Hills: Fiesch—; *Barkhan:* Dhora, Mazari—; *Duki:* Dhora, Mazari—; *Hindi:* Mazari, Mazri—; *Jhalawan:* Pish—; *Kohlu:* Dhora, Mazari, Pish—; *Musa Khel:* Dhora, Mazari—; *Pushtu:* Maizurrye—; *Salt Range:* Kalium, Kilu—; *Shahrig:* Dhora, Mazari, Pish—; *Sibi:* Dhora, Mazari, Pish—; *Sind:* Dhora, Fease, Pease, Pesh, Pfarra, Phana, Pfis—; *Trans-Indus:* Mazari, Mzarai—.

COPERNICIA Mart.

Stem erect, mostly of considerable height, rarely low, annulate in the lower part, covered higher up with the bases of the persistent petioles. Leaves terminal, flabelliform. Petioles with strong spines and a ligule. Segments induplicate, often with fibres between the segments. Spadices elongate-paniculate, much-branched, with several tubular spathes and superposed partial inflorescences, which are divided into several flower-bearing branchlets; each branchlet provided with more or less tubular spathe or with a simple bract at the point of its origin. Flowers hermaphrodite, single or in clusters, sessile, bracteate or bracteolate. Calyx tubular, more or less deeply 3-dentate. Corolla more or less distinctly tubular below, divided into 3-valvate, narrow segments, which are strongly sculptured-alveolate on the inner side. Stamens 6; filaments united at the base with the corolla-tube and forming in the throat a 6-lobed or 6-dentate corona, suddenly restricted and subulate in the upper part; anthers ovate or oblong, dorsifixed. Ovary consisting of 3 carpels which are free below and united above into one common style; stigma tridenticulate. Fruit globose or ovoid, formed by one carpel, with the rest of the abortive carpels at the apex; endocarp crustaceous-woody, thin. Seed free in the endocarp; hilum basilar; albumen deeply ruminate; embryo basilar near the hilum.—Species about 9.—Brazil, Venezuela, Argentine, San Domingo, Cuba, New Granada.

The genus is therapeutically inert.

1. **Copernicia cerifera** Mart. Hist. Nat. Palm. III, 56, t. 49 et 50 (excl. fig. 10) et 242 (partim).

Stem 9-12 m. high, cylindric, erect, at the base usually slightly thickened, 15-20 cm. diam., covered with the bases of fallen leaves, either in the upper part only or throughout. Leaves 1.2-2 m. long, forming a large spherical crown. Petiole 0.6-0.9 m. long with the base dilated, depressed, a little concave above and convex below, armed on the margins with stout, compressed spines; ligule glabrous, semirotundate-oblong, finely coriaceous; rhachis 0; limb suborbicular in outline, flabelliform-multifid, undivided in the central part for about 30-40 cm. from the apex of the petiole and on the sides only for about 2-3 cm., thinly coriaceous, cereo-pulverulent or whitish on both surfaces, divided into about 60 segments; central segments 80 cm. long from the apex of the petiole and about 3.5 cm. wide where broadest. Spadices much elongate, erect-patent, 1.5-1.8 m.

long, thrice divided, composed of several partial inflorescences which are alternately superposed. Primary spathes elongate, tubular, cylindric (at least above where they measure about 13 mm. diam.), finely striate lengthwise, glabrous, obliquely truncate at the mouth where the margin is entire or scarcely reticulate-fibrous, prolonged on one side into a triangular, acute, dorsally carinate point; partial inflorescences laxly paniculate-elongate; panicles divided into 6-7 branches, each arising from within a tubular spathe which resembles the primary spathes except for being smaller and more attenuate in the lower part; branches densely pilose-velutinous in every part, with the peduncular part included in the respective spathe; flower-bearing branchlets alternate-distichous. Lower branches much larger than the upper ones, sometimes twice branched, bearing 10-12 and more flower-bearing branchlets. Flowering branchlets filiform, each arising from the axil of a thin, membranous, narrowly lanceolate-acuminate bract. Flowers in small glomerules, usually 2-4 together, alternate-spirally arranged, each with a minute bracteole. Calyx shortly tubular, 2 mm. diam., slightly longer than broad, obsoletely trigonous; segments acute. Corolla tubular for more than the lower half, divided into 3 broad deltoid teeth, 4-sulcate on the inner side. Stamens with their filaments united with the corolla-tube and forming a fleshy ring (at the mouth of the tube) which is provided with 6 small linear teeth; anthers dorsifixed, erect, small, shortly ovate, rotundate at both extremities; pollen exceedingly small, globose. Carpels forming a turbinate body, fleshy below, cartilaginous in the upper part, suddenly contracted into the style; stigma small, very shortly 3-lobed. Fruit ovoid, sometimes globose-ovoid; mesocarp very small, with a few anastomosing-reticulate fibres; endocarp thinly parchment-like woody fragile. Seed free in the endocarp, 17-20 mm. long, 13.5-17.5 mm. broad, rotundate at both extremities; hilum at the base of one side; raphe occupying one side of the seed with 7-8 ramifications; albumen distinctly ruminate; embryo conical, basilar, slightly eccentrical.

Distribution: Brazil.—Sometimes grown in Indian gardens.

The roots are used as a substitute for sarsaparilla.

Brazil: Carnauba—; *English:* Brazilian Wax Palm—.

CORYPHA Linn.

Tall, stout, unarmed palms, dying after once flowering and ripening their seed, at the age of between 20 to 40 years. Leaves very large, orbicular or lunate, flabellately multifid, the segments folded lengthwise; petioles stout, concave, spinous at the edges. Flowers small, hermaphrodite. Spadix large, terminal, erect, pyramidally paniculate. Spathes many, tubular. Calyx cupular, 3-fid. Petals 3, connate at the base, ovate, acute, imbricate or subvalvate; Stamens 6; filaments subulate; anthers dorsifixed. Ovary 3-lobed, 3-celled; ovules basilar, erect in each cell; style short, subulate; stigma minute. Fruit usually 1 globose drupe with 2 abortive carpels at the base. Seed erect, globose or oblong; albumen uniform; embryo spiral.—Species 6.—Ceylon, Indo-Malaya.

C. pilearia Lour. is used medicinally in Cambodia.

1. **Corypha umbraculifera** Linn. Sp. Pl. (1753) 1187.—Rheede Hort. Mal. III, t. 1-12.

Trunk erect, straight, cylindric, 9-24 by 0.6-0.9 m., annulate. Leaves 2.4-4.8 m. diam., plicate, cleft to about the middle into 80-100 linear-lanceolate acute or 2-fid lobes; petioles 1.5-3 m. long, very stout, the margins armed with short, compressed, dark-coloured spines. Spadix pyramidal, 3-6 m. long, decompound, shortly and stoutly pedunculate; peduncles clothed with tubular spathes which are pierced by the primary branches; branches of the spadix forming pendulous spikes. Calyx broadly 3-lobed. Petals oblong, about 2 mm. long. Ovary suddenly contracted into the style. Drupe shortly stipitate, globose, 3.8 cm. diam., with 2 small arrested carpels at its base. Seeds globose, very hard, smooth and polished.

Distribution: Andamans, W. Peninsula, Ceylon. Cultivated in tropical India, Ceylon and Burma.

The fruit is a fish poison.

Bengal: Bajarbattuler, Tali, Tallier, Tara, Tarit—; *Burma:* Pebin—; *Canarese:* Baini, Indu, Sritale, Sritali, Tali—; *English:* Fan Palm, Great Fan Palm, Holy Palm, Java Fan Palm, Malabar Coast Fan Palm, South Indian Talipot Palm, Talipot Palm, Umbrella Palm—; *Malayalam:* Kutappana, Sitalam, Talippana—; *Marathi:* Bajarbattu, Tali—; *Sanskrit:* Alpayushi, Karalika, Katakali, Pakti, Sritala, Tali—; *Sinhalese:* Tala—; *Tamil:* Kudaippanai, Sidalam, Talappam, Talippanai—; *Telugu:* Dridhatalamu, Sritalamu—; *Tulu:* Panoli—.

BORASSUS Linn.

Very tall dioecious palms; trunk stout, unarmed. Leaves terminal, fan-shaped, plicately multifid, sides of lobes induplicate in vernation; petiole spinous; ligule short. Spadix very large, interfoliar, simply branched; peduncle sheathed with open spathes, male with stout cylindric branches that are densely clothed with closely imbricating bracts, enclosing spikelets of flowers, which hence appear as if sunk in cavities of the branch; female spadix sparingly branched, bearing a few scattered solitary flowers. Male flowers biseriate in small scorpioid spikelets enclosed in the bracts, secund; perianth glumaceous; sepals and petals 3 each, imbricate; stamens 6, pistillode of 3 bristles. Female flowers larger, globose; perianth fleshy, greatly accrescent in fruit; sepals imbricate; petals convolute; staminodes 6-9; ovary globose, entire or 3-4-cleft, 3-4-celled; stigmas 3; ovules basilar, erect. Fruit a large subglobose drupe with 1-3 obcordate compressed pyrenes; pericarp thinly fleshy; stigmas terminal. Seeds compressed, quadrate, top 3-lobed; testa adherent to the pyrene; albumen equable, hollow; embryo apical.—Species 7.—Africa, India, Malay Archipelago, New Guinea, Australia.

B. flabellifer Linn. is used medicinally in Cambodia and in Guinea; *B. flabellifer* var. *aethiopum* Warb. in the Gold Coast.

1. **Borassus flabellifer** Linn. Sp. Pl. (1753) 1187; Hook. f. Fl. Brit. Ind. VI, 482. (excl. *B. aethiopum*).—PLATE 989.

Trunk attains 30 m. in height and 60-90 cm. diam., black, swollen above the middle and again contracted upwards, while young covered with dry leaves or the bases of petioles, old stems marked with the black narrow scars of the petioles, near the ground with a dense mass of long rootlets. Leaves 0.9-1.5 m. diam., palmately fan-shaped, rigidly coriaceous, many-cleft into lanceolate or linear 2-fid lobes; segments 60-80, shining, folded along the midrib, with spinulose margins; petiole 60-120 cm. long, stout, semiterete, edges with hard horny spinescent serratures; ligule short. Male spadix simply branched, sheathed with many imbricated spathes, each vaginated at the base, but soon splitting into a long, concave, pointed, boat-like sheath, in substance very strong and fibrous; when young they are covered with a soft, downy, rust-coloured substance; (sometimes in the lower axil of the sheaths there is a bundle of smaller sheaths, forming a spathe like that now described, but without spadix). The superior 4 or 7 sheaths embrace each ramification of the spadix, each ramification ending in 1-3 cylindric spikes, beautifully imbricated with innumerable bracts. The lower and shorter ramifications of the spadix universally composed of 3 spikes spreading from each other in the same plane and distant from each other at the points about 7.5-12.5 cm., the middle one extending from 5-7.5 cm. beyond the other two. One or two of the higher ramifications sometimes divided into only 2 spikes and occasionally consisting of one only. These spikes are 30-37.5 cm. long, while the lower ones measure only 23-30 cm. The bracts of the spikes are broad, wedge-shaped, retuse, adhering by their lateral margins to the keel or back of the next above, forming a cavity for a second spikelet of about 10-12 small, sessile flowers; seldom more than one expanded at a time, beginning with the uppermost, so that there is a long succession of them. Flowers of spikelets arranged in 2 vertical opposite rows, beautifully serrated into each other, each spikelet forming an arch with its convex side undermost, the common receptacle of the little florets forming the other. Flowers appearing in parallel nearly straight rows, running from bottom to top, or in parallel oblique rows running from right to left, or from left to right round the spike, according to the position from which they are viewed. Sepals narrowly cuneate, tip truncate, inflexed. Petals shorter obovate spathulate. Stamens 6; filaments connate with the corolla into a stalk; anthers large, subsessile, oblong. Female spadix simple; spikes terminating the branches of the spadix; the lower end of the spadix is a smooth stem, sheathed with several spathes; spikes enveloped in bracts which cover all parts of it and rise over the flowers to the number of 8-12; a barren bract encircles the spadix, just below where the flowers commence to rise from it, and the upper end of the spadix, extending to a length of 5 or 7.5 cm. beyond the flowers, is also enveloped by these bracts. Flowers larger than the male flowers, 2.5 cm. diam., globose. Sepals fleshy, reniform, imbricate; petals smaller, convolute; staminodes 6-9. Ovary sub-trigonous, 3-4-celled; stigmas sessile, recurved. Fruit a drupe, when young pretty distinctly trigonous, but when old, the pulp round the pyrenes so swells as to give the fruit the appearance of an almost perfect globe, 15-20 cm. diam., seated on the greatly enlarged perianth. Pyrenes 3-1, obcordate, fibrous outside; endosperm horny, hollow; mesocarp fleshy and fibrous.

Distribution: More or less all over India, Ceylon, Burma.

The root has flavour; useful in leprosy; helps delivery.—The flower is good for enlargement of the spleen.—The fruit is sweet, cooling; intoxicating, fattening, aphrodisiac, anthelmintic, tonic, laxative, alexiteric; useful in biliousness, burning sensations, thirst, fatigue, "vata", blood complaints; causes "kapha".—The seed is diuretic, laxative, slightly intoxicating; cures biliousness; causes "kapha".—The fermented juice is aphrodisiac; causes "kapha" and flatulence (Ayurveda).

The fruit is stomachic, aphrodisiac, antibilious; improves taste; allays thirst.—The fermented juice is tonic, fattening, aphrodisiac, intoxicating, expectorant; allays thirst and the scalding of urine; causes headache; purifies the blood (Yunani).

The juice of the plant is used as a stimulant and antiphlegmatic. If taken regularly for several mornings in succession it acts as a laxative. When freshly drawn it is useful in inflammatory affections and dropsy; slightly fermented, it is used in diabetes. It is also diuretic and prescribed in chronic gonorrhœa.

A useful stimulating application, called toddy poultice, is prepared by adding fresh-drawn toddy to rice-flour till it has the consistence of soft poultice, and, this being subjected to a gentle fire, fermentation takes place. This, spread on a cloth and applied to the affected part, acts as a valuable stimulant application to gangrenous ulcerations, carbuncles and indolent ulcers.

The root is cooling and restorative.

The expressed juice of the leaf-stalk and young root is used in cases of gastric catarrh and to check hiccup. The fermented juice sometimes acts as a drastic purgative. An extract of the green leaves is used internally in secondary syphilis.

The ash of the spadix is given internally in bilious affections, and is largely used as an antiperiodic. It is a good antacid in heartburn.

The ash acts as a powerful blister and is applied on enlarged liver and spleen in combination with some other demulcents. The pulp of the ripe fruit is applied externally in skin diseases. Palm sugar is antibilious and alterative and used in hepatic disorders and gleet.

The light-brown, cotton-like substance from the outside of the base of the fronds, is employed by the Sinhalese doctors as a styptic to arrest hæmorrhage from superficial wounds.

The kernel of the fruit is useless in the symptomatic treatment of scorpion-sting (Caius and Mhaskar).

Every part of the plant is used medicinally in Cambodia. The root is considered diuretic and anthelmintic; it is much employed as a cure for gonorrhœa. The young plant is also given in gonorrhœa and is moreover considered antibilious and antidysenteric. Fresh-drawn toddy is taken in the morning on an empty stomach as a laxative. The sugar is used as an antidote in cases of poisoning.

The Khmers consider the sugar as a specific for *Strychnos* poisoning.

Bengal: Tal, Talgachh—; *Burma:* Tan—; *Cambodia:* Thnotchhmoul—; *Canarese:* Karitale, Ole, Oleya, Pane, Tala, Tale, Tali, Trinaraja—; *Ceylon:* Pannamaram—; *Deccan:* Taarkdizaar—; *Dutch:* Jagerboom, Weingeevende palmboom—; *English:* Brab Tree, Char Palm, Desert Palm, Fan Palm, Palmyra Palm—; *French:* Cocotier de mer, Rondier, Rondier eventail—; *German:* Palmyrapalme—; *Gujerati:* Tad—; *Hindi:* Tal, Tar, Tarkajhar—;

Konkani: Tadmadd—; *Malayalam:* Ampana, Eta, Karimpana, Pana, Talam, Trinarajan—; *Marathi:* Tad, Tamar—; *Portuguese:* Palmeira macha brava—; *Sanskrit:* Asavardu, Bhumipishacha, Chirayu, Dhvajadruma, Dirghadru, Dirghapadapa, Dirghaskanda, Dirghataru, Drumashreshtha, Drumeshvara, Guchhapatra, Karapatravan, Lekhyapatra, Madadhya, Madhurasa, Mahonmata, Patri, Shataparva, Tala, Taladruma, Tamsi, Tantugarbha, Tantuniryasa, Taruraja—; *Sinhalese:* Tal, Talgaha—; *Tamil:* Anbanai, Edagam, Karadalam, Karambanai, Nilam, Nungu, Panai, Pondai, Pondu, Pul, Purbadi, Puttrani, Sattruppanai, Talai, Talam, Tali—; *Telugu:* Karatalamu, Namatadu, Pentitadu, Potutadu, Tadu, Trinarajamu—; *Tulu:* Ole, Tari—; *Urdu:* Tad—; *Uriya:* Talo, Tanlo, Trinorajo—.

LODOICEA Labill.

A tall dioecious palm. Flowers in axillary spadices, surrounded at the base by several obliquely truncate spathes. Male: Spikes cylindrical; the flowers in subreniform clusters in hollows of the axis, imbricated in two rows, each flower subtended by a bracteole. Outer segments of the perianth spathulate-cucullate; inner obcuneate. Stamens about 36; filaments monadelphous; anthers linear, rudimentary pistil represented by 1-3 subulate processes. Female: Flowers fewer than in the male spikes, contained in cups formed by a pair of bracteoles; ovary ovoid, 3- rarely 2- or 4- celled; stigmas sessile; stamens represented by minute staminodes. Fruit a drupe, large, olive-green; usually 1-seeded; mesocarp thick, fibrous; pyrene large, bony, firmly attached to the mesocarp, usually 2-lobed; albumen homogeneous, cartilaginous; embryo placed between the lobes.—Species 1.—Seychelles.

1. **Lodoicea seychellarum** Labill. in Ann. Mus. Paris IX, 140, t. 13; W. J. Hook. in Curtis Bot. Mag. 2734-38.

Trunk 18-30 m. high, straight, apparently destitute of bark, annulate, about 30 cm. diam., with scarcely any difference in size to the very top. Leaves 12-20, large, 2.4-3 m. long, 1.5-1.8 m. broad (sometimes up to 6 m. long and 3.6 m. broad), the youngest rising from the centre, at first folded like a shut fan, and then clothed with a downy substance, later on broadly ovate with a central rib and regular folds diverging from it; margins more or less deeply cut, especially at the extremity; the colour bright yellow green; texture thin and dry. Spathes sheathing at the base of the spadices, small. Male and female flowers on different trees. Male spadix from the axils of the leaves, amentaceous, from 60-120 cm. long, 7.5-10 cm. diam. in the thickest part, cylindrical, tapering towards the apex, closely covered on all sides with densely imbricated, semicircular, slightly convex scales. When looking externally at these scales, a small aperture will be perceived, from which the stamens issue; and this aperture, though near the base, is not in the centre of each scale, but constantly on one and the same side; and as the scale laps over with that side the one next above it, so the aperture and the stamens will be found to pass through both. The flowers in subreniform clusters in hollows of the axis, imbricated in two rows. Sepals and petals oblong, yellowish-brown; the sepals rather larger and more angular than the inner. Filaments united at the base into one body; anthers linear, 2-celled, opening longitudinally, each cell terminating in two globular heads. Female spadix rising from the axils of the leaves, pendent, 60-120 cm. long, thick and woolly, tortuose, clothed with large sheathing, red-brown scales, which are singularly fimbriated, or more generally erose at the margin, and support several, more or less 'distantly placed, female flowers of different ages, at the same time, and of various sizes. Sepals and petals almost hemispherical and 2.5 cm. thick at the base; ovary almost concealed by the perianth, broadly ovate, narrow at the base above the insertion of the perianth. Fruit usually 1-seeded mostly 2-lobed.

Distribution: Seychelles. Cultivated in India.

Coco de mer is in great repute among the Arabs and the Indians as a tonic, preservative, and alexipharmic.

In Bombay, it is prescribed as a tonic and febrifuge; it is used to check diarrhœa and vomiting, especially in cholera. It is also commonly given to children, mixed with the root of Nux-vomica, for colic.

The water of the green fruit or its soft kernel is said to be antibilious and antacid when taken after meals.

Arabic: Narjilebahri—; *Bombay:* Jaharinaral, Jeharinaryal—; *Burma* Penle-on-si—; *Deccan:* Daryakanarel—; *Dutch:* Dubbele cocosnoot van de Seychelles, Dubbele Klapper, Maledivische noot, Seychellennoot, Zeeklapper—; *English:* Cocoanut of the Maldives, Double Cocoanut Palm, Sea Cocoanut Palm—; *French:* Coco de l'île Praslin, Coco des échelles, Coco de mer, Coco de Salomon, Coco des Seychelles, Cocotier des îles Seychelles, Cocotier des Maldives, Cocotier des Seychelles, Cul de négresse, Double Coco, Lodoice des Maldives, Lodoicée, Lodoicée des Seychelles, Lontar domestique, Rendier éventail, Rendier lontar, Tobel—; *German:* Doppelte Cocosnuss, Kokosartige Lodoicee, Maldivische Nuss, Meercocos, Seecocos, Wundernuss Salomons—; *Gujerati:* Daryanunariyal—; *Hindi:* Daryakanaryal—; *Indian Archipelago:* Calappalaut—; *Java:* Djenggi, Djenggli, Kelapalaut, Kepodjenggi, Pelokdjenggi—; *Malayalam:* Akraritennu, Kataltenna—; *Persian:* Nargilebahri—; *Portuguese:* Coco das Maldivas, Coco do Mar—; *Seychelles:* Coquinko, Tavacarre—; *Sinhalese:* Mudupol—; *Tamil:* Kadattengai—; *Telugu:* Samudraputenkaya—;

ELAEIS Jacq.

Stem unbranched, erect or decumbent, annulate, clothed with old petiole-bases. Leaves many in a terminal crown, large, pinnate; petiole short, thick, spiny on the margins or unarmed, with a short open sheathing base; leaflets ensiform, acuminate, recurved at the base. Spedices interfoliaceous, short, thick, peduncle loosely clothed with acute bracts; branches dense, male terminating in a spine, female more robust; spathes 2, complete, at length breaking up into fibres; male bracts very densely imbricate, connate into cupules; male bracteoles scale-like; female bracts large, lanceolate, spinescent, overtopping the flowers; female bracteoles like the sepals. Male flowers : Sepals linear or lanceolate, concave, imbricate. Petals smaller and thinner than the sepals, valvate. Stamens 6; filaments connate into a thick fleshy cylindrical tube below, free and reflexopatent at the apex; anthers linear-oblong, bilobed at the base, exserted, basifixed. Rudiment of ovary minute. Female flowers much larger than the male, ovoid, sepals ovate, imbricate at the base. Petals a little longer than the sepals, erect, convolute-imbricate, entire or split at the apex. Disk annular. Ovary ovoid or subcylindrical, 3-celled or by abortion 1-2-celled; style thick, pyramidal; stigmas large, linear, revolute; ovule filling up the cell; micropyle subapical. Fruit ovoid or obovoid 1-3-seeded, intruded at the base; umbilicate at the apex, stigmas terminal; pericarp spongy and oily, fibrous inside; endocarp thick, long, with 3 pores above the middle. Seed adnate just below the centre of the cell; testa thin; raphe reticulately branched; albumen cartilaginous, homogeneous, hollow; embryo opposite a pore of the endocarp.—Species about 4.—Tropical Africa and Eastern Tropical S. America.

E. guineensis Jacq. is used medicinally in Equatorial West Africa and in Brazil, *E. melanococca* Gaertn. too is used in Brazil.

1. **Elaeis guineensis** Jacq. Stirp. Amer. 280, t. 172, ed. Pict. 136, t. 25F.

Stem robust, 6-15 m. high, sometimes reaching 25.5 m., always quite straight, usually 20-30 cm. diam., and about 1 m. just above the ground, annulate, bearing the remains of the old leaves when young, never soboliferous. Leaves show their normal dimensions only after 6 or 8 years. Leaves of adult palm 20-40, forming a terminal crown, 3-5.1 m. long. Leaflets 100-160 pairs, lanceolate-linear, those in the middle of the leaves 60-120 cm. long and 45-60 cm. wide, those on the lower third 50-70 cm. long and 1.7-2.5 cm. wide. Petiole robust, 2.1-1.2 m. long, 10-20 cm. broad, suddenly broadened at the base, convex and often white tomentose below, yellowish green, spiny on the margins, spines 50-60 pairs. Spadices interfoliar, arising below the terminal bud sometimes to the number of 6 or 8 at the same time, the male ones always preceding the female by several weeks or even months; peduncle robust, compressed, 7.5-20 cm. long, 3.8-5 cm. broad and 1.5 cm. thick; spathe 10-30 cm. long, 6-7.5 cm. broad, coriaceous, floccose-tomentose on the outer surface. Male spadix: Flowering part forming an ovoid mass, rarely oblong or subspherical-compressed, 15-25 cm. long, 12.5-18 cm. broad and 6-10 cm. thick, with many branches bearing densely imbricate flowers. Branches brown, cylindric, subtriquetrous or flattened by mutual compression; 10-15 cm. long. Flowers very numerous, densely arranged in 20 longitudinal lines at least in the upper part. Sepals 3, free to the base, oblong, obtuse, greyish, scarious. Petals of the same size and shape as the sepals. Stamens 6; filaments short, united at the base; anthers sagittate. Rudimentary ovary reduced to a whitish protuberance Female spadix : Peduncle shorter than in the male, inflorescence more massive than in the male and sometimes more spherical, though slightly compressed 15-35 cm. long, 10-15 cm. broad; branches about 100-150, each bearing 6-40 flowers, usually 8-12. Flowers much larger than in the male; bract 1, whitish-yellow or greenish, lanceolate-subulate, about 3 mm. long and terminated by a spine which reaches beyond the flower; bracteoles small, ovate or ovate-oblong, shorter than the sepals. Sepals 3, oblong, 10-15 mm. long, scarious, subobtuse and often laciniate at the top. Petals 3, of the same shape as the sepals, of the same length or slightly longer; annular disk truncate or very slightly dentate. No rudimentary stamens. Ovary ovoid-cylindric, 6 mm. long, about 4 mm. diam., 1-locular (or exceptionally 2-3-locular); style whitish, about 3 mm. long, of almost the same diameter as the ovary; stigmas 3, rarely 4; ovule 1 in each loculus, inserted at the base, filling the whole cavity. Fruiting spadix 10-40 cm. long, 10-35 cm. broad. During the ripening of the fruits the terminal spines of the branches and bracts become longer. Fruit sessile, enclosed in the dry perianth, ovoid, attenuate and then suddenly truncate at the apex, with the dry style often persistent, red, passing into orange, or almost orange or vermilion red, or sometimes black in the upper half, and whitish yellow in the lower. Size variable according to the variety of the plant. Seed occupying the whole cavity of the endocarp.

Distribution: A native of Africa. Cultivated in India.

In Guinea, the oil from the sarcocarp is applied to wounds as a vulnerary. It is used as a liniment for rheumatism and courbature.

The Bubis of the Island of Fernando Po make an excellent poultice of the oil which they apply to wounds.

In Equatorial West Africa, the roots are used as a diuretic, and the fresh sap as a laxative.

Angola: Dihoho—; *Bacongo:* Matebbe—; *Baffuru:* M'bila—; *Baga:* M'Bia—; *Banziri:* Bete—; *Brazil:* Coqueiro de Dente—; *Congo:* Leba—; *Dutch:* Afrikaansche awarra, Afrikaansche oliepalm, Obepalm, Oliepalm van Guinea, Oliepalm van West Africa, Oliepalm van de Kust van Guinea, Palmietboom—; *English:* African Oil Palm, Oil Palm, True Oil Palm—; *French:* Aouara d'Afrique, Aouara des Caraibes, Aoura de Guinee, Aovora, Arouara des Caraibes, Avoira de Guinee, Elais de Guinee, Eleide, Eleide de Guinee, Noix de palme, Noix de palmier, Palmier crocro, Palmier epineux, Palmier a huile, Palmiste epineux—; *Ga:* Ngmetsho—; *Gaboon:* Oila—; *German:* Afrikanische Oelpalme, Guineische Oelpalme, Oelpalme—; *Guinea:* Toehntis—; *Hausa:* Kwakwa—; *Malinke:* Tintulu—; *Nzima:* Arairlair—; *Pahuin:* Aline—; *St. Thomas Island:* Denden, Palmeira andim—; *Surinam:* Aaavora, Avoora, Avouara, Avuara, Maba, Obe—; *Susu:* Tugi—; *Twi:* Abair—; *Yakoma:* Zamba—.

Cocos Linn.

Subgenus EUCOCCUS Drude.

Tall, unarmed, monoecious, with smooth annulate stems. Leaves pinnatisect; leaflets narrow. Spadix erect, at length drooping, simply panicled; branches bearing scattered female flowers, often between two males towards their bases and males above. Spathes 2 or more, lower short, upper fusiform or clavate; perianth coriaceous. Male flowers unsymmetric; sepals small, valvate, petals oblong, acute, valvate; stamens 6; filaments subulate; anthers linear, erect; pistilode minute or absent. Female flowers much larger; globose; perianth greatly accrescent; sepals imbricate; petals shorter, convolute with imbricate tips; ovary 3-celled, usually 1-ovuled; style short, stigmas recurved; ovules subbasilar. Fruit large, ovoid, terete or trigonous, 1-seeded; style terminal; pericarp thick, fibrous; endocarp bony, with 3 basal pores, the remains of the 3 cells; seed cohering with the endocarp; albumen hollow, equable, merely lining the endocarp with a thick hard coat; embryo opposite one pore.—Species 1.—Probably of American origin but widely distributed throughout the tropics.

1. Leaves 1.8-4.5 m. long	1. *C. nucifera.*
2. Leaves 1.8-2.4 m. long	2. *C. schizophylla.*
3. Leaves surrect, arcuate; leaflets concinnous	3. *C. yatai.*

In Brazil, *C. coronata* Mart., *C. flexuosa* Mart., *C. nucifera* Linn., *C. schizophylla* Mart., *C. yatai* Mart., are used medicinally; *C. nucifera* Linn. is similarly used in China and Indo China.

The fat from the kernel of *C. nucifera* Linn. is officinal in Holland and Portugal.

1. **Cocos nucifera** Linn. Fl. Zely. 392.—PLATE 990.

Trunk 12-24 m. high, straight or curved, marked with ring-like leaf-scars, which are not prominent, rising from an inclined swollen base which is surrounded by a mass of rootlets. Leaves 1.8-4.5 m. long; leaflets equidistant, 60-90 cm. long, linear-lanceolate, coriaceous; petioles 0.9-1.5 m. long, stout. Spadix 1.2-1.8 m. long, stout, androgynous, simply panicled. Lower spathes 60-90 cm. long, oblong, hard, splitting lengthwise. Male flowers unsymmetric; sepals small, valvate; petals 6 mm. long, oblong, acute, valvate. Female flowers larger than the male, 2.5 cm. long, globose, supported by broad bracteoles. Sepals 2.5 cm. diam., round, concave, imbricate. Petals shorter than the sepals, convolute, with imbricate tips. Fruit 20-30 cm. long, 3-gonously obovoid or subglobose, green or yellowish; albumen lining the endocarp, the cavity large, filled with a sweet somewhat milky fluid, known as coconut milk.

Distribution: Origin not sufficiently known. Various tropical countries claim to be its native country.

The root is anthelmintic.—The fruit is sweet, cooling; oleaginous, indigestible; fattening, tonic, laxative, aphrodisiac, cardiotonic; useful in leprosy, thirst, biliousness, diseases of the blood, burning sensations, tuberculosis; causes "kapha" and intestinal worms.—The flower is cooling; useful in diabetes, dysentery, leprosy, urinary discharges; constipating.—The dried fruit improves taste; aphrodisiac, fattening; constipating.—The milk is cooling, oleaginous; appetiser; aphrodisiac, laxative; useful in bronchitis, biliousness, "kapha" and "vata", tumours.—The fermented juice is oleaginous, intoxicating, aphrodisiac, anthelmintic; causes biliousness.—The oil is indigestible, aphrodisiac, fattening; useful in urinary complaints, asthma, bronchitis, consumption, ulcers (Ayurveda).

The bark is good for the teeth and also in scabies.—The fruit is sweet; aphrodisiac, diuretic; useful in fever, paralysis, liver complaint, piles; enriches the blood; increases the weight of the body; causes pain in the kidney and lumbago in persons of cold constitution.—The fermented juice is stomachic, and anthelmintic.—The oil is sweet; tonic, diuretic, anthelmintic; lessens inflammation; promotes the growth of hair; useful in lumbar pain, piles, scabies (Yunani).

The root is used as a diuretic, and also as an astringent gargle in sore throat. It has been found useful in uterine diseases.

The tomentum is used for stopping blood in cases of wounds, bruises, leech-bites, etc.

The flowers are considered astringent.

The freshly-drawn milk from the young spadix is refrigerant and diuretic, a preparation known as toddy poultice. The fermented juice constitutes one of the spirituous liquors described by the ancient writers. A tumblerful of the fresh juice is sometimes taken early in the morning on account of its refrigerant and slightly aperient properties.

The immature nuts are employed as an astringent in the sore throats of children. The water is a good refrigerant, useful in thirst, fever, and urinary disorders. It may be drunk to almost any quantity without injury and is considered a purifier of the blood. It is commonly believed in Bengal, however, that too much cocoanut milk induces a hydrocele swelling of the scrotum.

The pulp of the young fruit is cooling and diuretic.

The fresh milk has been successfully employed in debility, incipient phthisis, and cachetic affections. In large doses it proves aperient, and in some cases actively purgative.

Cocoanut oil is said to promote the growth of hair; hence it is much used as a local application in alopecia and in loss of hair after fevers and debilitating diseases.

The oil is given in plethora and as a vermifuge in Jamaica. It is given while fasting, warmed and with a little sugar, in flux. An emulsion of the oil and kernel is prescribed in coughs and pulmonary diseases generally. Pound the kernel with water, place it to settle, and skim off the cream. This is preferable to the expressed oil.

In the Antilles, the cocoanut is the popular remedy for tapeworm.

The cleared shell of the nut or portions of it are burnt in a fire, and, while red hot, covered by a stone cup. The fluid, which is deposited in the interior of the cup, is rubefacient, and is an effectual domestic remedy for ringworm.

In Ceylon, the oil is applied to the head for cooling; the pulp of the young fruit is given in sunstroke. The root is said to strengthen the gums.

The roots, the milk, the oil, the meat, and the wood are used medicinally in Cambodia. The roots are diuretic; a decoction is prescribed in blennorrhagia, bronchitis, and liver complaint with or without jaundice. The milk is purgative; it is given in hæmoptysis and eruptive fevers. The oil is chiefly used in the preparation of ointments, and is applied topically for scabies and ringworm. The nut is taken internally together with other drugs for cutaneous ulcers and especially for ulceration of the mucous membrane of the nose. The wood is prescribed in the treatment of piles.

The milk and meat of one nut eaten early in the morning on an empty stomach failed to expel the hookworm (Caius and Mhaskar).

The milk is not an antidote to snake-venom (Mhaskar and Caius).

The oil has been the subject of much chemical study.

Ahanta: Kukui—; *Annam:* Cay dua—; *Aowin:* Agye—; *Arabic:* Jadhirdah, Jouzehindi, Narjil, Shajratuljouzehindi, Shajratunnarjil—; *Banziri:* Diko—; *Bengal:* Dab, Narakel, Narikel, Nairyal—; *Betsimisaraka:* Voaniho—; *Bicol:* Niog—; *Bombay:* Maar, Mahad, Mar, Naralchajhada, Narel, Naril, Naural—; *Brazil:* Coco da Bahia, Coqueiro da India, Inajaguasuiba—; *Burma:* On, Ondi, Ong, Onsi, Onti, Ung, Ungbin—; *Cagayan:* Niog—; *Cambodia:* Daung—; *Canarese:* Gitaka, Gitaku, Kobari, Kobbari, Kurube, Matte, Narikela, Narikera, Siyala, Tare, Tenginakayi, Tengu, Trinaraja—; *Chinese:* Yeh Tzu—; *Deccan:* Narel, Narelkajhar—; *Dutch:* Calappusboom, Cocos, Cocosboom, Cocospalm, Kalappus, Klapper, Klapperboom, Klapperpalm, Koko, Kokosboom, Kokosnootenboom, Kókosnootpalm, Kokospalm—; *English:* Cocoa Nut, Cocoanut Palm, Coconut Palm, Coconut Tree—; *Ewe:* Yevunai—; *Fanti:* Kube—; *French:* Cocotier, Cocotier commun, Cocotier des Indes, Cocotier nucifere, Cocotier ordinaire, Cocotier porte-noix, Palmier, Roi des vegetaux—; *Ga:* Akokoshicho—; *Gabon:* Omangata—; *German:* Calappabaum, Calappusbaum, Cocosnussbaum, Cócospalme, Echte Kokospalme, Indianischer Nussbaum, Kokosbaum, Kokosgalen, Kokospalme, Kokospalmenbaum, Wandernde Seeuferpalme—; *Guam:* Niyog—; *Gujerati:* Naliyer, Nariel, Nariera, Nariyela, Naryal—; *Hausa:* Kwakwar Attagara—; *Hindi:* Narel, Nariel, Nariyal, Nariyalkaper, Nariyel—; *Ilocano:* Niog—; *Italian:* Cocco—; *Java:* Bhungkana, Bhungkananjijor, Enjor, Ijor, Kalapa, Kerambil, Klapa, Klendah, Njejor, Njijor, Njor, Tangkalkalapa, Wiiklapa, Witkrambil—; *Konkani:* Madd—; *Krepi:* Agorne, Naiti, Yevone, Yevune—; *Krobo:* Kokosi, Ngmaicho—; *Malayalam:* Chentennu, Chocham, Karikku, Kulittai, Langalam, Nalikeram, Narikelam, Tenna, Tennu— *Marathi:* Mad, Mada, Mahad, Mar, Naral, Naralchajhada, Naralmad, Narel, Narela, Narula, Tenginmar, Varala—; *Mundari:* Burkadaru, Narieldaru—; *Mysore:* Nur—; *Nepal:* Naryal—; *New Caledonia:* Nou, Nou boibate, Nou bouangae, Nou do, Nou goine, Nou jomalate, Nou kigoute, Nou mia, Nou pougne, Nou tamen, Nou tiguit—; *Nzima:* Kukwe—; *Pahuin:* M'ban n'tang—; *Pampangan:* Ngongot—; *Persian:* Badinj, Darakhtebandinj, Darakhtenargil, Nargil—; *Philippines:* Coco, Lubi, Pangosin, Tapiasin—; *Polynesia:* Niu—; *Portuguese:* Coqueiro, Palmeira—; *Quittah:* Ene—; *Roumanian:* Cocotier—; *Russian:* Kokosovoe dyerevo—; *Sanskrit:* Dakshinatriya, Dridhanira, Dridhaphala, Duraruha, Garikera, Jataphala, Jungo, Karakambha, Kaushikaphala, Kurchashekhara, Kurchashirshaka, Langali, Mahaphala, Mangalya, Mriduphala, Mutkuna, Nadikeli, Narikari, Narikela, Nilataru, Payodhara, Phalakeshara, Phalamunda, Putodaka, Rasaphala, Sadaphala, Sadapushpa, Shiraphala, Skandhaphala, Skandhataru, Subhanga, Sutanga, Toyagarbha, Trinaraja, Tryakshaphala, Tryambakaphala, Uchhataru, Varaphala, Vishvamitrapriya—; *Sinhalese:* Pol, Polgaha, Polgass, Polnawasi, Tambili—; *Spanish:* Cocotero, Rey de los vegetales—; *Tagalog:* Adiavan, Niog, Pamocol—; *Tamil:* Edagam, Ilangali, Keli, Muppudaikay, Nadigelam, Naligelam, Naligeram, Narigelam, Papparattennai, Talai, Ten, Tengay, Tengu, Tennai—; *Telugu:* Ettabondalakobbari, Gujjunarikadamu, Kobbari, Kobbera, Nalikeramu, Narikadamu, Narikelamu, Narikeramu, Langali, Mukkantipandu, Te, Temranu, Tenkaya, Trinarajamu—; *Tulu:* Tare—; *Twi:* Kokosi—; *Urdu:* Nariyel—; *Uriya:* Gotoma, Langoli, Nodia, Paido, Poiu, Trinodrumo—; *Visayan:* Anibong, Bonotan, Botong, Cayomanis, Dahili, Lobi, Lubacan, Niogngapoti, Lobingahinbaon, Lobingapilipog, Limbaon, Niog, Pangonn, Pilipog, Potot, Tamis, Tamisan, Tayomanis—; *Zambales:* Ongot—.

2. **Cocos schizophylla** Mart. Hist. Nat. Palm. II, 119, t. 84, 85 T. f. IV et vol. III, 324.

A low palm, often almost stemless; caudex 1.8-2.4 m. high, subannulate. Leaves 1.8-2.4 m. long; leaflets not quite equidistant, subopposite or alternate, erect-patent, linear or subfalcate, 2.5 cm. broad, very reduplicate, apex rounded-obtuse, short-mucronate, the midrib very prominent above. Spadix from between the leaves, 60-90 cm. long; peduncle compressed, whitish-tomentose-pulverulent, with subtriangular coriaceous bracts; rhachis sulcate-angular. Branches many, in the lower part of the spadix about 5 cm. distant, in the upper part more approximate. Spathe 90 cm. long, with a mucronate top when closed, linear-lanceolate when open. Male flowers 4.2-6.3 mm. long; calyx 3 or 4 times shorter than the corolla, whitish; sepals lanceolate-acuminate; petals lanceolate or linear-oblong. Stamens one-third of the corolla; filaments subulate, white; anthers linear, emarginate at both ends; pistillode minute or absent. Female flowers subglobose or shortly conical, slightly larger than the males. Sepals broadly triangular or suborbicular, shortly acuminate. Petals suborbicular. Ovary subglobose. Stigmas pyramidal. Drupe subglobose, the size of a pigeon's egg.

Distribution: A native of Brazil. Cultivated in Indian gardens.

The juice of the unripe fruit is used for inflammation of the eyes in Brazil.

Brazil: Alicuri, Aricuri, Ariri—; *English:* Aracuri Palm—.

3. **Cocos yatai** Mart. Palm. Orbign. 93, t. 1, fig. 1, t. 30.

Stem covered in the upper part with the bases of the petioles. Leaves surrect, arcuate; petiole spinous-serrate; leaflets concinnous, slightly stiff, narrowly linear, acuminate. Male flowers: Petals lanceolate, acute. Female flowers: Petals oblong-ovate, obtuse. Drupe size of a pigeon's egg, acute at the apex; putamen oblong, slightly acute at the base, rotundate at the apex.

Distribution: Argentine. Cultivated in Indian gardens.

The fleshy part of the fruit is used as an anthelmintic in Brazil.

Brazil: Yatai.

CALAMUS Linn.

Perennial, armed, tufted palms usually climbing by means of hooked spines on the rhachis of the leaves, or by whip-like spinous prolongations (flagella) of the rhachis, or of the spadix, or of the leaf-sheath; stem simple, cylindric, ringed at the nodes, upper internodes clothed with spinous leaf-sheaths. Leaves pinnatisect, rarely digitate, alternate; leaflets few or many, lanceolate, rarely broad, acuminate, nerves parallel; sheath armed, produced into a ligula or ochrea, and with or without a lateral armed flagellum. Spadices axillary, usually elongate, much-branched, armed; sometimes produced into a spinous flagellum. Spathes tubular or open, sheathing the peduncle and branches of the spadix, and passing into bracts and bracteoles (spathels and spathellules). Flowers small, usually polygamo-dioecious, in usually distichous often scorpioid spikelets, solitary or binate (a female or male or both) in the bracteoles. Male flowers: Calyx cupular, 3-lobed or 3-toothed, coriaceous; petals 3, acute, coriaceous, valvate, sometimes combined at the base into a stipes; stamens 6, filaments short, anthers dorsifixed, versatile. Female flowers slightly accrescent; calyx as in the male; corolla tubular below, 3-fid, valvate; staminodes forming a cup; ovary incompletely 3-celled, clothed with retrorse scales; style short or rather long; stigmas 3; ovule basilar, erect. Fruit globose or ellipsoid, usually strongly beaked; style terminal; pericarp thin, clothed with appressed deflexed closely imbricating polished scales. Seed subglobose or oblong, smooth or pitted; albumen equable or ruminate; embryo ventral or basal.—Species over 200.—Tropical and subtropical Asia, Malaya, Philippines, New Guinea, Australia and a few in tropical Africa.

1. Leaflets many, equidistant, linear-ensiform .... 1. *C. rotang.*
2. Leaflets in distant opposite groups of 3-5 .... 2. *C. travancoricus.*
3. Leaflets in very distant groups of 3 .... 3. *C. rheedei.*

C. margaritae Hce. is used medicinally in China; *C. rotang* Linn., *C. verus* Lour. in Annam, and Cambodia.

C. verus Lour. enters into the composition of Malayan ipoh.

The resin from *C. Draco* Willd. (*Palmijuncus Draco* Rumph.) is officinal in Portugal.

1. **Calamus rotang** Linn. Sp. Pl. ed. 2, 463 (planta Ceylonensis tantum et excl. syn. Hort. et Herb. Amboin.); Roxb. Fl. Ind. III, 777.

Stem very slender, scandent; sheaths flagelliferous, sparingly armed with short, flat spines. Leaves 45-60 cm. long, petiole very short, stout, margined with small straight or recurved spines with conical laterally compressed bases; leaflets very many, equidistant, lower 20-30 cm. long and 8-13 mm. broad, upper gradually smaller, linear-lanceolate acuminate, 3-veined, veins naked above or bearing distant bristles sometimes 6 mm. long, midrib alone setose beneath, margins setulose. Male spadix very long, decompound, flagelliferous, sparingly spinous; spathes elongate, tubular, lower 15-25 by nearly 1.7 cm. diam., sparingly armed with scattered recurved spines, upper unarmed, scurfy; spikes 2.5-3.8 cm., recurved or revolute, bracteoles densely crowded, cymbiform. Male flowers secund in 3-4 series, 13 mm. long; calyx cupular, base thickened, striate lobes broad, acute; petals sessile, smooth, acute; filaments very short, subulate. Female flowers 2.5 mm. long, scattered along the slender branches of the spadix; calyx conical, tubular, 3-toothed, base dilated, truncate petals sessile, tips only exserted. Fruit seated on the minute perianth, subglobose, 13 mm. diam., mucronate, scales many in a vertical series, pale yellow with a very narrow thin, discoloured margin and shallow median channel.

Distribution: Central Provinces, Deccan, Carnatic, Ceylon. Not in Bengal.

The plant is pungent, acrid, bitter, with flavour; cooling, alexiteric; useful in "kapha", "vata", biliousness, burning sensations, inflammations, piles, strangury, erysipelas, dysentery, thirst, ulcers, urinary discharges, leprosy, leucoderma, diseases of the blood, the uterus and the vagina.—The root is given in chronic fevers.—The leaves are acrid, bitter, pungent; laxative; useful in diseases of the blood, biliousness; cause "vata".—The seeds are acrid, sour; useful in blood diseases, "kapha"; cause biliousness.—The sprouts are pungent, saltish; useful in "kapha" and "vata" (Ayurveda).

The wood is given as a vermifuge in Annam.

In Cambodia, the root is considered anti-dysenteric, anti-bilious, hypotensive, tonic, febrifuge, and depurative.

The root is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar)

Annam: Cay may—; *Cambodia:* Lompeak, Rompeak—; *Canarese:* Betta, Habbe, Nagabetta—; *English:* Chair-bottom Cane, Common Rattan, Rattan, Slender Rattan, Water Rattan—; *French:* Canne épineuse, Canne à main, Rotang, Rotin—; *Malay:* Rottamn, Rotang—; *Malayalam:* Chural, Nirvanni, Purampu—; *Sanskrit:* Abhrapushpa, Dirghapatraka, Dirghavalli, Gandhapushpa, Kalana, Latavamsa, Manjarinamra, Nichula, Ratha, Rathabhra, Shita, Sushena, Vanira, Vanjula, Vetasa, Vetasi, Vetra, Vidula—; *Sinhalese:* Wewel—; *Spanish:* Cana de Bengala, Cana de India—; *Tamil:* Arini, Mellisuppirambu, Nirvanji, Pirambu, Pisin, Sadi, Sural, Suvedagandam, Suvedam, Vaniram, Vanjikkodi, Vedasam, Vettiram—; *Telugu:* Bethama, Bettamu, Niruprabba, Pemu, Prabba, Prabili, Sannabettamu—; *Tulu:* Suralbetta—.

2. **Calamus travancoricus** Bedd. MS. in Herb. Kew.; Hook. f. Fl. Brit. Ind. VI, 452; Rheede Hort, Mal. XII, t. 64.

Stem very slender, scandent. Leaves 45-60 cm. long;

leaflets 10-15 cm. long, 1.3-1.7 cm. broad, broadest about or above the middle and thence tapering to a capillary point, in distant opposite groups of 3-5, narrowly oblanceolate, thin, costae 3, very slender, naked above, sparsely setulose beneath; rhachis and petiole very slender, armed with small straight and recurved spines; sheath armed with slender, straight, flattened prickles; petiole 10-15 cm. long, dorsally rounded, margins acute, much compressed towards the base and there chiefly spiny. Spadix 60-90 cm. long, slender, flagelliferous; peduncle short, flattened, young white scurfy, margins shortly spiny. Inflorescences about 5 cm. long, shorter than the membranous flat spathes, male decompound with spreading, very slender branches bearing short, flexuous, almost capillary spikes of flowers 3 mm. long; female inflorescence with simple, distichous, recurved spikes and rather larger flowers. Lower spathes tubular, compressed at the base, with shortly spinous angles produced into a long, membranous, sheathing lamina; upper spathes and spathels tubular, obliquely truncate, spathellules short, acute, calyx strongly striate; corolla twice as long as the calyx, not striate.

Distribution: Deccan Peninsula from Malabar to Travancore.

The tender leaves are used in dyspepsia, biliousness, and ear troubles; they are considered anthelmintic.

Canarese: Nayibetta—; *Malayalam:* Cheruchural, Kattuchural—.

3. **Calamus rheedei** Griff. in Calc. Journ. Nat. Hist. V, 73.—Rheede Hort, Mal. XII, t. 65.

Leaflets in very distant groups of 3 on a long rhachis armed with scattered, short, recurved spines, linear-lanceolate, acuminate. Fruiting spadix with the flat, open, acute spathes longer than the ovoid, dense clusters of ellipsoid or oblong fruits.

This plant is only known from Rheede's plate and has never been described from living or dried specimens.

Distribution: Malabar.

The powdered dried seed is applied to ulcers.

Malayalam: Kattuchural—.

NIPA Wurmb.

A prostrate aestuarial gregarious palm; rootstock stout, branched, covered with the sheaths of old leaves, leafing and flowering at the ends of the branches. Leaves pinnatisect; leaflets linear-lanceolate, sides reduplicate in vernation. Spadix short, terminal, erect in flower, fruiting drooping. Flowers monoecious, male in catkin-like lateral branches of the spadix, female crowded in a terminal head, perianth glumaceous. Male flowers minute, surrounded with setaceous bracteoles; sepals linear with broad truncate inflexed tips, imbricate; petals smaller; stamens 3; filaments connate in a very short column; anthers elongate, basifixed; pistillode 0. Female flowers much longer than the male; sepals 6, rudimentary, displaced; staminodes 0; carpels 3, connate, tips free with an oblique stigmatic line; ovules 3, erect. Fruit large, globose, syncarp of many obovoid, hexagonal, 1-celled, 1-seeded carpels, with pyramidal tips and infra-apical stigmas; pericarp fleshy and fibrous; endocarp spongy and flowery; seed erect, grooved on one side; testa coriaceous, viscid within, adherent to the endocarp; hilum broad; endosperm horny, equable, hollow; embryo basilar, obconic.—Species 1.

1. **Nipa fruticans** Wurmb. in Verh. Bat. Genootsch. I (1779) 349; Lam. Ill. t. 897.

Rootstock 45 cm. diam., rooting along the lower surface. Leaves very many, erect and recurved, 4.5-9 m. long; petiole 1.2-1.5 m. long, very stout, sheath short; leaflets innumerable, shortly decurrent on the rhachis, 1.2-1.5 m. long, bright green above, glaucous and 3-keeled beneath, tip subulate, midrib scurfy. Spadix 1.2-2.1 m. long, peduncle 0.9-2.4 m. Male flowers very small; sepals linear with clavate inflexed tips; petals similar but narrower; ovary densely crowded, cuneate-obovate, angled, top pyramidal. Fruit 30 cm. diam., nodding; carpels 10-15 cm. long, densely packed on a globose, areolate receptacle, compressed, broadly cuneiform, dark brown, crown 3- or more- angled; seed as large as a hen's egg.

Distribution: Sundribuns, Burma, throughout Malay to Queensland, Ceylon.

In the Philippine Islands, the pounded leaves are used as a remedy for the bites of centipedes and a cure for ulcers.

Andamans: Poothada—; *Bengal:* Gabna, Gulga—; *Burma:* Dane—; *Cagayan:* Tata—; *English:* Nipa Palm, Water Cocoanut—. *Guam:* Nipa, Sasa—; *Gujerati:* Pardeshitadio—; *Hindi:* Gulga—; *Malay:* Nipah—; *Philippines:* Lasa—; *Ponape:* Parran—; *Sinhalese:* Gimpol—; *Sulu Archipelago:* Ballang—; *Tagalog:* Nipa, Sasa—; *Telugu:* Kotitikaya, Nipamu—; *Zambales:* Saga—.

—.—

PANDANACEAE.

Dioecious trees or shrubs, sometimes scardent with aerial roots, the stem often forked and supported, as if standing on stilts, by numerous adventitious roots. Leaves coriaceous, narrow, acuminate, sessile, with a sheathing base, in tristichous spirals, the edges and midrib usually spinous, the spines on the margins erect, those on the midrib usually retrorse; transverse nerves prominent. Spadix axillary or terminal, simple or branched, clothed with leafy spathes; flowers small crowded or catkin-like; perianth 0; bracts and bracteoles 0. Male flowers: Stamens numerous; filaments free or connate; anthers erect basifixed. Pistillode small or obsolete. Female flowers: Staminodes small or 0. Ovary 1-celled, free or connate with those of the contiguous flowers in phalanges of 2 or more; ovules solitary and suberect, or many and parietal; stigmas subsessile, papillose. Fruit a syncarpium, consisting of numerous more or less obconic drupes, the apex of each drupe or carpel distinct, pyramidal, conical or convex, crowned by the hardened style or stigma. Seeds minute; testa striate; albumen abundant, hard and oily; embryo minute.—Genera 3. Species 225.—Old World tropics and a few warm temperate.

The Order is not therapeutically defined.

PANDANUS Linn. f.

Palm-like small trees or shrubs; stems sometimes very short, erect, or procumbent and rooting. Leaves long, spirally arranged at the ends of the branches, sheathing at the base. Flowers dioecious. Male flowers: Spadix compound, with numerous yellow or white keeled spathes. Stamens numerous, single or united into bundles on the spadix; filaments short or long; anthers sessile, elongate, 2-celled. Female flowers: Spadix simple, protected by leafy spathes. Staminodes 0. Ovary of 1 or several 1-celled carpels, free or connate; ovule solitary in each cell, ascending from the base of a parietal placenta. Fruit an oblong syncarpium, usually solitary, of woody or fleshy thick-walled drupes, which are deciduous singly or in masses from a fleshy receptacle, the upper ½ of each carpel hollow or filled with a spongy pith-like tissue. Seeds large, strophiolate; albumen fleshy; embryo small; radicle inferior.—Species 150.—Palæotropics.

P. utilis Bory is used medicinally in Madagascar; *P. tectorius* Soland. in Cambodia.

1. **Pandanus tectorius** Soland. ex Parkinson, Journ. Voy. H. M. S. Endeavour (1773) 46.—*P. fascicularis* Lam. Encyc. Méthod. I (1783) 372.—*P. odoratissimus* Linn. f. Suppl. (1781) 424.—PLATE 991 (under *P. fascicularis* Lam.).

Shrubby, up to 6 m. high, rarely erect; stem supported by aerial roots. Leaves glaucous-green, 0.9-1.5 m. long, ensiform, caudate-acuminate, coriaceous, the marginal spines pointing forward, those on the midrib pointing forward or backward. Male flowers: Spadix with numerous subsessile cylindric spikes 5-10 by 2.5-3.8 cm., enclosed in long white fragrant caudate-acuminate spathes. Staminal column 6-13 mm. long; anthers longer than the slender filaments, cuspidate, inserted along the whole length of the upper portion. Female flowers: Spadix solitary, 5 cm. diam. Carpels confluent in obpyramidal groups of 6-10 or fewer; stigmas short, reniform, yellow. Fruit an oblong or globose syncarpium, 15-25 cm. long and broad, yellow or red; drupes numerous (50-60), each consisting of 5-12 carpels; carpels 5-7.5 cm. long, turbinate, angular, the crown smooth, convex, more or less depressed round the reniform stigmas.

Distribution: Seacoast of the Indian Peninsula on both sides, Andamans.

The leaves are pungent, bitter, with flavour; alexiteric, aphrodisiac, somniferous; useful in strangury and tumours.—The flower is pungent, bitter; improves complexion.—The anthers are useful in pruritus.—The fruit is useful in "vata", "kapha", and urinary discharges (Ayurveda).

The leaves are useful in leprosy, small pox, syphilis, scabies, heat of body, pain, leucoderma, diseases of the heart and the brain; aphrodisiac, tonic.—The anthers are useful in earache, headache, leucoderma, eruptions, diseases of the blood.—The oil cools and strengthens the brain (Yunani).

The oil and otto, obtained from the bracts, are considered stimulant and anti-spasmodic and are administered for headache and rheumatism. A medicinal oil is prepared from the roots. The aerial root is used medicinally by the Sinhalese.

In Cambodia, the root is considered diuretic, depurative, and tonic.

Arabic: Kadar, Kadhi, Kazi—; *Bengal:* Kea, Keori, Ketkikeya, Ketuki, Keya—; *Bombay:* Kenda, Keur, Keura—; *Burma:* Satthapu, Tsatthapu—; *Cagayan:* Arquig, Paddan—; *Canarese:* Kaide, Kedige, Ketaki, Mundige, Tale—; *Deccan:* Kedgi—; *English:* Screw Pine, Umbrella Tree—; *French:* Vaquois odorant—; *Gujerati:* Kewoda—; *Hindi:* Gagandhul, Keora, Ketgi, Keura—; *Jolo:* Laha—; *Konkani:* Ato, Covasso, Keto—; *Malayalam:* Kaita, Ketaki, Palliyambu, Tala—; *Marathi:* Keoda, Keora—; *Mundari:* Keoradaru—; *Nellore:* Mogalisandlu, Mogilinara—; *New Caledonia:* Pan—; *Nicobar:* Leram—; *Persian:* Gulkiri, Kadi, Keora—; *Sanskrit:* Chamarapushpa, Dalapushpa, Dhulipushpika, Dirghapatra, Gandhapushpa, Halina, Indukalika, Jambuka, Kantadala, Ketaka, Krakachachhada, Medhya, Nripapriya, Panshula, Shivadvishta, Sthiragandha, Suchikapushpa, Tikshnapushpa, Viphala—; *Sinhalese:* Mudukeyiya, Rumpi, Woetakeyiya—; *Tagalog:* Pandan—; *Tamil:* Kaidai, Kandal, Kechiya, Kedagai, Kedagi, Madi, Muchali, Mudangal, Mundagam, Talhai—; *Telugu:* Gedaji, Gedangimogali, Gojjangi, Ketaki, Mogali, Mugali—; *Tulu:* Kedayi, Mundeyi—; *Uraon:* Keoro—; *Urdu:* Keora—; *Uriya:* Ketoki, Kia, Kiya, Konta—; *Visayan:* Pandan, Pangdan, Panhacad—.

TYPHACEAE.

Aquatic or palustrine perennial herbs. Leaves linear, erect or floating, sheathing below; nerves parallel. Flowers small, monoecious or, by abortion, dieocious, small or minute, densely crowded in globose or cylindric 1-sexual bracteate spikes the upper flowers of which are males; bracteoles 0. Perianth of membranous, green scales or slender hairs. Male flowers: Stamens 1-7; filaments free or connate; anthers basifixed, erect, cuneate or linear-oblong, dehiscing longitudinally; connective sometimes produced. Pistillode 0. Female flowers; Ovary superior, 1-2-celled, the cells 1-ovulate; ovules pendulous from the top of the cell; styles free, short or long, persistent, laterally papillosely stigmatic. Fruit small, membranous or drupaceous. Seeds pendulous; albumen fleshy or floury; embryo axile, cylindric, the radical end thickened; plumule in a lateral slit.—Genera 2. Species about 15.—Cosmopolitan.

Rhizomes amylaceous, diuretic, and astringent; stamens and pollen astringent and styptic.

TYPHA Linn.

Marsh herbs. Leaves erect, spongy. Flowers small, in very dense superposed cylindric spikes, often intermixed with hairs with dilated tips. Perianth of capillary hairs or in the male flowers obsolete. Stamens 1 or more; connective thickened at the tip. Ovary often reduced to a clavate-tipped hair, long-stalked, narrowed into a capillary style, with a clavate or filiform stigma. Fruit very minute; pericarp membranous, indehiscent or follicular. Seed with striate testa; albumen floury.—Species 12.—Temperate and tropical, in marshes.

1. Leaves trigonous above the sheath. Pollen 4-globate ...... 2. *T. elephantina.*
2. Leaves semiterete above the sheath. Pollen globose ...... 1. *T. angustata.*
3. Leaves slender, semicylindric at the sheath. Pollen simple .. 3. *T. laxmanni.*

The rootstock is astringent and diuretic; the down styptic and vulnerary.

The following species are used medicinally in Europe— *T. elephantina* Roxb., *T. latifolia* Linn.—; in Japan and China—

T. elephantina Roxb., *T. Japonica* Miq., *T. latifolia* Linn., *T. laxmanni* Lepech.—; in Malaya—*T. shuttleworthii* Koch and Sond.—; in Madagascar—*T. javanica* Schnitzl.—; in South Africa—*T. capensis* Rohrb., *T. latifolia* Krauss.—.

1. **Typha angustata** Bory & Chaub. Exp. Sci. Morée, Bot. I (1832) 338.

A robust plant; stem 1.5-3 m. high. Leaves exceeding the flowering stem, 2-2.5 cm. broad, semicylindric above the sheath. Spikes cylindric, the male and female spikes often separated by a considerable interval, the female spikes pale brown, 0.8-2.2 cm. diam. Female flowers mixed with clavate-tipped pistillodes; bracteoles subspathulate, equalling the linear stigmas, both longer than the hairs. Pollen simple. According to Aitchison the species sometimes bears male and female flowers on different plants.

Distribution: More or less throughout India.—N. Asia, N. Africa.

The rootstock is astringent and diuretic.

La Reunion: Foutaque, Voune—; *Telugu:* Dabbujambu, Jambu, Jammu—.

2. **Typha elephantina** Roxb. Fl. Ind. III (1832) 566.—PLATE 992.

A gigantic gregarious marsh plant 1.8-3.6 m. high with erect grass-like equitant leaves 1.2-1.8 m. long, 1.8-3.8 cm. broad, somewhat convex dorsally and concave ventrally, becoming narrower keeled and trigonous towards the sheath. Flowering stem embraced at the base by the leaf-sheaths, straight, glossy, spongy within the top forming the rhachis of the female and male spikes. Lower female spike 15-25 cm. long by 7.5-25 mm. diam., finally brown, a deciduous foliaceous spathe embraces the whole inflorescence when young. Male spike 5-7.5 cm. above the female 20-30 cm. long, pale coloured with a basal spathe and 2-3 smaller upper ones, all deciduous, anthers 1-5, 2.5 mm. long with 4-globate pollen. Bracts between the flowers very numerous, filiform 2 3-cleft. Female flowers with lanceolate stigma, mixed with clavate pistillodes and bracteoles with fasciated tips longer than the inner (perianth?) hairs.

Distribution: Marshes from N.-W. India to Assam and southwards, Indus Delta.—Algeria.

The plant is cooling, aphrodisiac; good for the eyes; useful in strangury, splenic enlargement, burning sensation, leprosy; increases "vata" (Ayurveda).

The down of the ripe fruit is used as an application to wounds and ulcers, which acts in the same way as the medicated cotton wool.

The root-stock, which abounds in starch, is somewhat astringent and diuretic, and is employed in Eastern Asia in dysentery, gonorrhœa and measles.

Bengal: Hogla—; *Bolan:* Kul—; *Bombay:* Ramabana, Ramban—; *Canarese:* Apu, Jambuhullu—; *English:* Bulrush, Cat's Tail, Elephant Grass, Reed Mace—; *Gujerati:* Ghabajarin—; *Hindi:* Mothitrina, Pater—; *Kashmir:* Pitz, Yira—; *Kohlu:* Lukha—; *Kumaon:* Bora—; *Malta:* Buda irkika, Stiancia—; *Marathi:* Eraka, Panalavhala, Rambana—; *Nasirabad:* Lukha—; *Punjab:* Boj, Bori, Dab, Dib, Gond, Kundar, Lukh, Pan, Patira, Pitz, Yira—; *Porebunder:* Ghadudi, Pan, Pani—; *Saharanpur:* Patera—; *Sanskrit:* Eraka, Gundra, Gundramula, Shari, Shimbi—; *Shahrig:* Lukh, Lukha—; *Sind:* Buri, Pun—; *Tagalog:* Balangot, Dilangbutiqui—; *Tamil:* Anaikkorai, Anaippul, Chambu—; *Telugu:* Enugajammu, Jammugaddi, Kandra—; *Uriya:* Hogola—; *Visayan:* Homaihomai, Lampacanai—; *Zhob:* Lukha—.

3. **Typha laxmanni** Lepech. in Nov. Act. Acad. Petersb. 85, 355 (excl. syn. DC.).

Dwarf, 60-90 cm. high. Leaves slender, semicylindric at the sheath. Male spikes 2.5-5 cm., female 1.7-2.5 cm. by 5-8 mm. diam. Female flowers ebracteolate mixed with pistillodes, hairs very short much shorter than the subobtuse stigmas,-pollen simple.

At once distinguished from all the previous species by its small size and slender leaves, but very closely allied in the European and Oriental T. minima, which, according to Koerner, has bracteoles.

Distribution: Kashmir.—N. Asia and westwards to Russia.

This is one of the several Chinese species known to afford 'p'u huang', consisting of the stamens and the golden yellow pollen, and used as an astringent and styptic.

ARACEAE.

Herbs usually glabrous (rarely armed), with watery, acrid, or milky juice, stemless or with a short stock or corm or tuber; or shrubs with sympodial branches, climbing by aerial roots. Leaves in shrubby species alternate, distichous or spiral; in herbaceous species few, clustered or solitary. radical sometimes appearing without or after the flowers; petiole with a sheathing base; blade entire or lobed or pinnate or perforate. often with cataphyllaries at the base of the leaf-sheaths. Flowers 1-sexual or hermaphrodite, sessile on a spadix which is more or less completely enclosed in a green or coloured spathe; when 1-sexual, usually monoecious (rarely dioecious) with males towards the apex and females at the base of the spadix, often with neuters between them and sometimes with neuters above the males. Perianth 0, or of a few scales (rarely cupular or urceolate). Stamens in hermaphrodite flowers 4-8, in male flowers 1 or more, distinct or confluent; anthers 2-4-celled, free or (in confluent stamens) connate by means of the thickened connective, the cells discrete or contiguous, free or buried in the connective, and opening by a terminal pore (rarely by a longitudinal slit); pollen globose or ellipsoid, powdery or conglomerate. Ovary sessile, 1-3-celled; ovules in each cell 1 or more, basilar, apical, axile or parietal; style short or long; stigma discoid or lobed. Fruit of many small free or connate berries or drupes adnate to the spadix. Seeds in each drupe or berry 1 or few (rarely many), small or large, usually embedded in a mucilaginous pulp; albumen copious or 0; embryo axile or in exalbuminous genera thick, with the plumule in a lateral slit. Genera 107. Species about 1,000.—Tropical and temperate.

A. Spadix with a flowerless top or absent in PISTIA and CRYPTOCORYNE. Stamens free. In female flowers staminodes absent. Ovary 1-celled
   1. Submerged or marsh shrubs. Ovaries in 1 whorl .... CRYPTOCORYNE

2. Marsh shrubs. Ovaries spirally disposed .... Lagenandra.
3. Floating stemless herbs .... Pistia.
4. Terrestrial tuberous herbs
   a. Leaves compound. Ovules basal .... Arisaema.
   b. Leaves pedatipartite, appearing after the flowering. Ovules basal .... Sauromatum.
5. Leaves various and flowers coetaneous. Ovules basal .... Typhonium.

B. Spadix with or without an appendage. Stamens free, anther-cells broader than their connective. Ovary 1- or more- celled. Tuberous herbs. Leaves 3-sect, segments pinnatifid
1. Appendage naked; neuters absent .... Amorphophallu
2. Appendage slender, naked; neuters below the males ...... Synantherias.
3. Appendage absent; neuters very large .... Plesmonium.

C. Spadix with or without an appendage, usually shorter than the spathe. Anthers sessile, densely crowded, prismatic or broad. Leaves undivided, often peltate
1. Limb of spathe refracted, open. Ovules parietal .... Remusatia.
2. Limb of spathe erect. Ovules many, parietal .... Colocasia.
3. Limb of spathe erect. Ovules few, basal .... Alocasia.

D. Spadix without an appendage. Stamens free. Perennial herbs, flowering and leafing at the same time
Spathe wholly persistent. Ovary 2-4-celled .... Homalonema.

E. Spadix without an appendage. Stamens distinct; filaments flat; anther-cells terminal. Ovary truncate. Mostly climbers
1. Spadix sessile. Ovule 1, basal. Berries free .... Scindapsus.
2. Spadix sessile. Ovary 1-2-celled, many-ovuled. Berries confluent .... Rhaphidophora.

F. Spadix without an appendage
1. Prickly rigid herbs. Spathe many times longer than the sessile spadix .... Lasia.
2. Stem scandent. Leaves distichous .... Pothos.
3. Stemless. Leaves ensiform. Spathe absent .... Acorus.

Amylaceous, often acrid and purgative, more or less stimulant.

A poisonous acrid juice is contained in various species of ANTHURIUM, ARUM, PHILODENDRON.

Official :—*Acorus Calamus* Linn. in Austria, Germany, Holland, Hungary, Italy, Norway, Russia, Sweden, Switzerland; *A. Calamus* Linn. (*A. odoratus* Lamk.) in Portugal.

Arum Dracunculus Linn. (*Dracunculus vulgaris* Schott) and various other species in Portugal.

Cryptocoryne Fisch.

Herbs usually marsh or aquatic; stem short or 0 or a creeping rootstock. Leaves narrow or broad. Spathe tubular with connate margins and a transverse septum within below. Spadix very slender, its tip adnate to the septum of the spathe. Male inflorescence cylindric. Stamens 1-2, distinct; anthers short, sessile, truncate, cells 2 with conic perforate tips, pollen vermiform. Female inflorescence a single whorl of connate 1-celled ovaries with a few neuters; ovules many, erect, orthotropous; styles short, recurved. Fruit a fleshy syncarpium, of connate, coriaceous, many-seeded carpels, the valves stellately spreading. Seeds oblong; testa rugose; albumen copious; embryo axile; plumule sometimes germinating in the fruit.—Species 40.—Indo-Malaya, marsh plants.

This genus is therapeutically inert.

1. **Cryptocoryne Spiralis** Fisch ex Wydler in Linnaea V (1830) 438.—*Ambrosinia Spiralis* Roxb. Hort. Beng. (1814) 65.

Caudicle 10-20 cm. long or longer, about 4-5 mm. thick, stoloniferous; internodes 1-1.2 cm. long. Petiole scarcely distinct, broadly vaginate, vagina passing over into the blade; blade linear-lanceolate, 10-15 cm., long, 8-12 mm. broad, long-narrowed from the middle to the base; lateral nerves ascending towards the apex. Peduncle very short, included together with the tube in a sheath. Lower tube of the spathe, including the inflorescence, obconical, about 2 cm. long, almost 1 cm. wide above, 7-8 mm. below; upper tube scarcely any; blade purple, linear-lanceolate, 10 cm. long or longer, below more than 1 cm. broad, within strongly transversely lamellate, with a denticulate margin, purple, at first twisted, finally straight. Female inflorescence 5-gonous, male one 3-4 mm. long, separated from each other by a naked interval of about 8 mm.; appendix shortly conical, 1.5 mm. long. Ovaries oblong, narrowed into a short, outward-bent style; stigma broadly elliptic.

Distribution: From Khandesh to N. Kanara, Calicut, Coromandel Coast, Ceylon, Bengal.

It is a well-known drug in Ceylon, where it is employed by the native doctors in decoctions, in combination with other drugs as a remedy for infantile vomiting and cough, and in the case of adults for abdominal complaints and fever.

The plant is considered a substitute for Ipecacuanha. It contains neither emetine nor cephaeline (Chopra).

Tamil: Nattativadayam—; *Telugu:* Nattativasa—.

PISTIA Linn.

A floating gregarious monoecious stoloniferous herb. Leaves sessile in a close spiral, obovate-cuneate, together forming a cup; veins parallel; stipulary sheaths small, membranous. Spathe small, shortly pedunculate, tubular below, open above; tube short; limb ovate, concave, spreading. Spadix adnate to the back of the tube of the spathe, free above. Male inflorescence a whorl of a few sessile connate stamens below the apex of the spadix, with a whorl of minute neuters below it; anther-slits vertical. Female inflorescence a solitary oblong 1-celled ovary, obliquely adnate to the spadix for nearly its whole length, the tip free, forming a conical style with a discoid stigma; ovules many, crowded on a parietal placenta, orthotropous. Fruit ovoid; pericarp thin, bursting irregularly. Seeds many, oblong or obovoid; testa ultimately rugose; albumen copious, floury; embryo minute, apical, cuneiform.—Species 1. Tropics and subtropics except Polynesia and Macronesia.

P. stratiotes Linn. is used medicinally in China, Indo China, Malaya, La Reunion, Brazil.

1. **Pistia stratiotes** Linn. Sp. Pl. (1753) 963.—PLATE 993.

A floating stemless stoloniferous herb with a peculiar muriatic odour; roots of tufted simple white fibres clothed with fibrillae. Leaves 3.2-10 cm. long, variable in breadth, obovate-cuneate, rounded or retuse at the apex, densely and closely pubescent on both surfaces; nerves few or many, flabellately arranged, converging within the margin. Spathe about 13 mm. long, obliquely campanulate, white, gibbous and closed below, contracted about the middle, dilated and nearly orbicular above.

Distribution: Of the genus.

The plant is bitter, pungent, with a flavour; cooling, laxative; useful in "tridosha", fevers, diseases of the blood, tuberculous glands (Ayurveda).

The root is bitter; diuretic; good for wounds, inflammation, burns (Yunani).

The plant is cooling and demulcent, and is given in dysuria. It is said to destroy bugs most effectually.

The root is laxative and emollient.

The leaves are made into poultices and applied to hæmorrhoids. Mixed with rice and cocoanut milk they are given in dysentery, and with rose-water and sugar in cough and asthma.

The ashes are applied to ringworm of the scalp.

The Mundas use the juice of the plant medicinally in ear complaints.

The whole plant has long been employed in ancient Chinese prescriptions. It is applied to boils, syphilitic eruptions and in many skin complaints.

A decoction of the leaves is used in La Reunion as a diuretic and prescribed in diseases of the urinary tract. Made into pills the leaves are used in syphilis.

An oil was prepared by boiling the juice of the leaves in cocoanut oil and used externally in chronic skin diseases. Relief was obtained in a number of cases (Koman).

Arabic: Sataraltayutas—; *Ashanti:* Ntanoa, Todia—; *Awuna:* Aflo—; *Bengal:* Takapana—; *Bombay:* Gondala, Prashni—; *Cagayan:* Aluluan—; *Canarese:* Antaragange—; *Chinese:* Fou Ping—; *Deccan:* Anterghunga—; *English:* Water Lettuce, Water Soldier—; *Ewe:* Aflo—; *Fanti:* Ntangtangaba—; *Ga:* Taitraimantai—; *Gujerati:* Jalakumbhi—; *Hausa:* Kainuwa—; *Hindi:* Jalkhumbi, Jalkhunbi, Takapaṇa—; *Hova:* Tsinkafonkafona—; *Ilocano:* Loloan—; *La Reunion:* Pensée d'eau, Pourpier de Madagascar—; *Madagascar:* Azafo, Hazafo—; *Malay:* Kambiang, Kiambang—; *Malaya:* Fow phing—; *Malayalam:* Koddapail—; *Marathi:* Gondala, Jalamandvi, Prasni—; *Mundari:* Jhalkumbhi—; *Sadani:* Jhalkumbhi—; *Sanskrit:* Akashamuli, Ashakumbhi, Daladhaka, Jalavalkala, Khali, Khamulika, Kumbhika, Kumuda, Kutrina, Paniyaprishthaja, Parni, Prashni, Shvetaparna, Varimuli, Variparni—; *Sinhalese:* Deyaparandella—; *Tagalog:* Quiapo—; *Tamil:* Agasatamarai—; *Telugu:* Akasatamara, Autaratamara, Nirubudiki—; *Tongking:* Beo cai—; *Twi:* Ntaya—; *Urdu:* Jalakumbhi—; *Uriya:* Baujhanjhe—; *Visayan:* Cayapo, Louan-louan—.

LAGENANDRA Dalz.

Aquatic herbs with the characters of Cryptocoryne, but with many ovaries in close cycles at the base of the spadix.—Species 5.—India, Ceylon.

The genus is therapeutically inert.

1. **Lagenandra ovata** (Linn.) Thwaites Enum. Pl. Zeyl. (1864) 334.—*L. toxicaria* Dalz. in Hook. Journ. Bot. IV (1852) 289, V (1853) t. 4.

Rootstock reaching 5 cm. thick, creeping, simple, coriaceous, annulate; root-fibres vermiform. Leaves 15-37.5 by 5-12.5 cm., elliptic-oblong, obtuse or acute, margins undulate, entire, base acute or rounded; midrib very stout, with many slender veins diverging from it; petiole as long as the blade, semicylindric, 13 mm. diam.; stipular sheaths acuminate, 2-keeled. Peduncle shorter and more slender than the petiole, compressed. Spathe 7.5-23 cm. long, tubular below; the limb 2-3.8 cm broad, ovate-lanceolate, caudate-acuminate, slightly twisted; tube much shorter than the long-tailed limb. Male inflorescence cylindric; anthers crowded, yellow, the cells with tubular tips. Female inflorescence of many ovaries, in many cycles, crowded in a globose head; stigma sessile, pulvinate, 5-angled; ovules 4-8 on a basal placenta. Syncarpium on a short decurved peduncle, globose, 3.8-5 cm. diam., carpels about 8 mm. long, partially dehiscent. Seeds 10 mm. long, narrowly oblong, furrowed.

Distribution: From the Konkan to N. Kanara, Mysore, Coorg, Cochin, Travancore, Ceylon.

The plant is said to have insecticidal properties.

Southern Konkan: Vatsanabh—.

ARISAEMA Mart.

Tuberous monoecious or dioecious herbs. Leaves 1-3, often coming up with the flowers but sometimes after them, trisect or pedate or verticallately 5- or more- sect. Spathe deciduous; tube convolute; limb often acuminate or tailed, usually incurved. Spadix included or exserted, always with a barren appendage which is often long and filiform. Male inflorescence of many usually stipitate connate stamens; anthers 2-5, oblong or subglobose, the cells distinct or confluent, dehiscing by pores or vertical slits. Female inflorescence; Flowers densely crowded; ovary ovoid, oblong or subglobose, 1-celled; ovules 2 or more, basal, orthotropous; style short or 0. Neuter flowers 0 or few, subulate, above the males or the females or on the appendage. Fruit a 1- or few- seeded berry. Seeds ovoid or globose; testa rather thick; albumen copious; embryo axile.—Species 105.—Asia, Abyssinia, America.

1.	Limb of spathe ovate-lanceolate, caudate-acuminate	1. *A. speciosum.*
2.	Limb incurved, broadly cymbiform, acuminate	2. *A. tortuosum.*
3.	Limb suberect, cymbiform, long caudate-acuminate	3. *A. leschenaultii.*

Corm violently acrid amylaceous and nutritive.

The following species are used medicinally in China—*A. consanguineum* Schott, *A. ringens* Schott, *A. serratum* Schott, *A. thunbergii* Blume—; in Indo China—*A. thunbergii* Blume—; In Malaya—*A. consanguineum* Schott—: in North America—*A. triphyllum* Torr.

1. **Arisaema speciosum** Mart. in Flora (1831) 458.—Plate 994.

Rootstock oblique, or shortly creeping and rooting; often 12.5 cm. diam. Leaf solitary; petiole very stout, green, smooth, often marbled with brown or purple; leaflets 40-48 cm., edged with red or purple, all petiolulate, acuminate, lateral dimidiate, cordate, median ovate, cuneate or rounded at the base; nerves broadly reticulate; petiolule 1.3-5 cm. Peduncle much shorter than the petiole. Limb of spathe ovate-lanceolate, incurved, caudate-acuminate, 5-15 cm. long, banded white and purple; appendage cylindric or fusiform at the often inflated base, narrowed into a very long filiform tail, base usually ovoid, not truncate or disciform; tube of spathe 5-10 cm., striped with purple. Spadix pink or yellowish, tail 30-45 cm., dark purple; anther-cells 4-5; ovaries ovoid, stigma sessile, pulvinate. Very variable in size and colouring.

Distribution: Temperate Himalaya, from Kumaon to Sikkim and Bhutan.

In Hazara, the root is stated to be poisonous; in Chumba, it is applied pounded to snake-bites. In Kulu, where the tuber is given to sheep for colic, the fruit is said to have deleterious effects on the mouth when eaten by children (Stewart).

The root is not an antidote to snake-venom (Mhaskar and Caius).

Punjab: Kiralu, Kirikikukri, Sampkikhumb—; *Sinhalese:* Walkidaran—.

2. **Arisaema tortuosum** Schott Melet. I (1832) 17.—*Arum tortuosum* Wall. Pl. As. Rar. II (1830) 10.—*Arisaema curvatum* Kunth Enum. III, 19.—Plate 995.

A tall plant reaching 90 cm. high; tubers spheroidal, up to 10 cm. diam. Leaves 2-3, pedatipartite; petioles 30-90 cm. long, the sheaths often mottled with purple; leaflets sessile or petiolate, 10-20 cm. long, of variable breadth, ovate-lanceolate or linear-lanceolate, subcaudately acuminate, distant or crowded or almost radiately arranged. Peduncle 60-120 cm. long. Spathe 10-15 cm. long, green outside; tube about as long as the limb, subcylindric, gaping, gradually dilating into the limb, pale purplish inside; limb ovate or ovate-oblong acuminate, broadly cymbiform, incurved. Spadix 1- or 2- sexual; male flowers stalked; appendage very long, much exserted, tapering like a rat's tail, quite smooth, usually erect at first, then porrect, and again erect. Ovaries ovoid, attenuated into a short style. Berry 4-5-seeded.

Distribution: Sikkim Himalaya, Manipur, Bengal, W. Peninsula.

It is stated to have poisonous qualities. In Kulu, the seeds are said to be given with salt for colic in sheep. The roots are used to kill the worms which infest cattle in the rains (Stewart).

Nepal: Birbanka—; *Punjab:* Don, Gurin, Jangosh, Kirakal, Kirkichalu—

3. **Arisaema leschenaultii** Bl. Rumph. I (1835) 93.—Plate 996.

Monoecious or dioecious; tubers 5 cm. diam., globose; roots from the upper side of the tuber. Leaf solitary; petiole stout, 60 cm. long, usually mottled and banded with red and brown; leaflets 5-11, whorled, 10-15 by 3.8-6.3 cm., sessile, lanceolate. caudate-acuminate, dark green above, paler beneath, base tapering; midrib stout. Peduncle short. Spathe 10-30 cm. long, dark green, striped externally with purple; tube as long as the limb, cylindric, narrow, ribbed, erect, gradually dilated into the limb; limb slightly decurved, ovate-lanceolate, cymbiform, terminating in a straight obtusely acuminate tip of variable length. Spadix shorter than the spathe, about 7.5 cm. long, gradually passing into a very narrowly clavate pale green smooth appendage with a rounded, sometimes verruculose tip. Anthers 3-4-nate, sessile, with a few subulate neuters above them. Ovaries many, minute, densely crowded.

Distribution: Nilgiris, Travancore, Ceylon.

The roots are employed as a medicine by the Singhalese (Thwaites)

Sinhalese: Walkidaran—.

Sauromatum Schott.

Tuberous herbs leafing after flowering. Leaf solitary, pedatipartite with a long petiole. Flowers monoecious. Spathe with a short peduncle; tube cylindric, short, the margins connate below; limb very long, narrow, open, reflexed. Spadix sessile, very long, with a slender barren appendage as long as the spathe. Male and female inflorescences short, widely distant, dense-flowered, with a few large clavate neuters close above the females. Male inflorescence: Anthers large, sessile, subcompressed, 4-lobed; cells contiguous, opposite, obovate-oblong, opening by terminal pores; connective at length prominent. Female inflorescence: Ovary oblong, 1-celled, rounded at the apex; ovules 1-2, erect basal; style very short or 0. Fruit of obpyramidal 1-seeded substipitate berries. Seeds globose or somewhat convex, with an obconic strophiole; albumen copious; embryo axile.—Species 4.—Palæotropics.

The genus is therapeutically inert.

1. **Sauromatum guttatum** Schott in Schott & Endl. Meletem. (1832) 17.—PLATE 997.

Tuber very large, globose, up to 15 cm. diam., producing buds from the top and sides. Leaf solitary. Petiole up to 50 cm. long, very stout at the base, up to 2 cm. diam., attenuate upwards, spotted or not; lamina in outline rotund-cordate, pedate-palmate to pedatifid or pedatisect; segments oblong or oblong-lanceolate, acuminate, the intermediate one up to 25 cm. long, 15 cm. broad, the lateral ones on each side 3-7, getting gradually smaller; primary lateral nerves about 5-6 on each side, distant from each other 1-1.5 cm., and secondary parallel nerves united into an intramarginal nerve 2-3 mm. from the margin. Peduncle measuring scarcely 5 cm. beyond the cataphylls and 2 cm. diam., pale green, cataphylls few, soon withering, 5-10 mm. long, triangular, acute, broad at base. Spathe large, very variable in size; tube 5-10 cm. long, slightly ventricose below, above subcylindric, about 2-2.5 cm. wide; lamina in aestivation convolute into a purple-livid cylinder which is tumid at the base, then straight-ascending and slender acuminate, when expanded oblong-lanceolate, very large, 30-70 cm. long, 8-10 cm. broad, lower margin irregularly sinuate-repand, upwards gradually narrowed into an acumen, purple below, light green in the middle and above, often with angular dark purple spots or blotches, finally recurved from the middle, descending and touching the ground. Spadix about $1/3$ shorter than the spathe. Female inflorescence cylindric, about 2-2.5 cm. long, 1.5 cm. diam.; rudiments of sterile flowers stipitate-claviform, spreading, inserted immediately above the female flowers; male inflorescence 1.5 cm. long, distant from the female inflorescence by an interval of about 6 cm. which bears some scattered minute, acute, aculeiform rudiments; appendix cylindric, obtuse, about 30 cm. long, 1 cm. diam., pale fuscous or purplish. Pistils very numerous, small, obovoid, subtruncate at top, 2-ovulate. Stamens with very short filaments.

Distribution: Punjab, Gangetic Plain, W. Himalaya, Chota Nagpur, Bombay Presidency, Burma.—Sumatra.

The tubers are used as a stimulating poultice.

Bombay: Loth—; *Central Provinces:* Bhasamkand—.

TYPHONIUM Schott.

Tuberous herbs. Leaves entire, or 3-5-lobed, or pedatisect, Flowers monoecious. Tube of spathe short, convolute, with a constricted mouth, persistent; limb of spathe ovate-oblong, lanceolate, or linear, deciduous. Spadix usually exserted, with a long smooth barren appendage. Male and female inflorescences distant, with neuters above the females and sometimes also below the males. Male inflorescence: Stamens 1-3; anthers subsessile, the cells contiguous, opening by pores or chinks; pollen globose. Female inflorescence: Ovary 1-celled; placenta basal; ovules 1-2, erect; stigma sessile. Fruit of ovoid 1-2-seeded berries. Seeds globose; albumen copious; embryo axile.—Species 25.—Indo-Malaya.

The genus is not therapeutically defined.

1. **Typhonium trilobatum** (Linn.) Schott in Wien. Zeitschr. III (1829) 72.—PLATE 998.

Tuber subglobose, up to 4 cm. diam. Petioles 25-30 cm. long, often surrounded by a variegated sheath, pale green, irregularly mottled with purple; lamina hastate-subtrisect, segments all acuminate, front-segment ovate, 8-18 cm. long, 5-10 cm. broad, lateral ones obliquely ovate, shorter subbilobed at base. Pendunce thin, 5-7 cm. long; tube of spathe oblong, 2.5 cm. long, 1-1.5 cm. wide, lamina oblong-ovate-lanceolate, acuminate, 15 and more cm. long, 5-7 cm. broad, outside pale green, inside rose-purple. Spadix nearly 15 cm. long. Female inflorescence short-cylindric, about 7 mm. long; rudiments of sterile flowers filiform, flexuose, almost 1 cm. long, occupying a space of about 7 mm. long immediately above the female flowers. Male inflorescence about 1.25-1.5 cm. long, 5 mm. diam., rose-pink, separated from the female inflorescence by an interval of about 2 cm. Appendix very shortly stipitate, broad at the base, 4-7 mm. diam., elongate-conical, about 5-12 cm. long.

Distribution: W. Peninsula, Ceylon, Bengal, Assam, Burma, Chittagong, Malay Peninsula.—Siam, Cambodia, Tonkin, Java, Borneo.

The roots are exceedingly acrid, and used in poultices; and also applied externally to the bite of venomous snakes, at the same time given inwardly about the size of a field bean. It is certainly a most powerful stimulant.

The acrid principle is very volatile; and by the application of heat, or by simple drying, the root becomes innocuous or even wholesome as articles of diet. As an article of food, it relaxes the bowels and thereby relieves hæmorrhoids.

The tubers eaten with bananas cure stomach complaints (Carter).

The roots are not an antidote to snake-venom (Mhaskar and Caius).

Bengal: Ghetkochu—; *Hasada:* Cakad—; *Malayalam:* Chena—; *Naguri:* Najompicki—; *Sinhalese:* Panuala—; *Tamil:* Karkarunaikkilhangu, Karunaikkilhanga—; *Telugu:* Duradakandagadda, Kandagadde—.

AMORPHOPHALLUS Blume.

Tuberous herbs flowering before or together with the leaves. Leaf solitary, 3-partite; segments pinnatisect. Flowers monoecious. Spathe with an open or convolute funnel-shaped or campanulate limb. Spadix exserted or included; appendage large, short or long. Inflorescence cylindric, dense-flowered; males and females contiguous; neuters 0. Male inflorescence: Stamens 2-4; anthers sessile, the cells oblong, opening by apical pores. Female inflorescence: Ovaries globose, 1-4-celled; ovules in each cell solitary, subbasal, anatropous; style short or long; stigma entire or 2-4-lobed. Fruit of clustered subglobose or obovoid berries. Seeds large; albumen 0; embryo macropodous.—Species about 90.—Tropical Asia and Africa.

1. Style many times longer than the ovary .... 1. *A. campanulatus.*
2. Style absent .... 2. *A. prainii.*

The corm is mucilaginous, acrid, irritant, and used in the cases of snake-bite and acute rheumatism.

A. rivieri Durieu is used medicinally in China—; *A. dracon-*

tioides N. E. Br., *A. flavovirens* N. E. Br., and *A. johnsonii* N. E. Br., in the Gold Coast.

A. sativus Bl. and *A. prainii* Hook. fil. are used as poisons in Malaya.

1. **Amorphophallus campanulatus** (Roxb.) Bl. in Dcne. in Nouv. Ann. Mus. Par. III (1834) 366 excl. syn. praeter Roxb.—PLATE 999.

Tuber depressed-globose, 20-25 cm. diam., bulbiferous, dark brown. Leaves appearing long after the flowers, 30-90 cm. broad; segments spreading, simple or forked; petioles 60-90 cm. long, stout, warted, dark green, with paler blotches; leaflets 5-12.5 cm. long, of variable width, obovate or oblong, acute, strongly many-veined, with green edges. Peduncle short, stout, elongating in fruit; sheaths linear-oblong. Spathe campanulate, pointed, 15-25 cm. broad, strongly closely veined, with recurved undulate and crisped margins, greenish-pink externally with pale ocellated blotches, base within purple. Spadix as long as the spathe; appendage varying in size up to 20 by 12.5 cm., globose, conoid or amorphous, sinuately lobulate, dark red-purple, spongy within. Male inflorescence subturbinate, about 7.5 cm. long, 2.5-5 cm. diam. Anthers densely crowded, pale yellow; pollen golden yellow. Female inflorescence 7.5 cm. long or more, reaching 6.3 cm. diam. Ovaries densely crowded, sessile, depressed-globose; style 13 mm. long, stout, ascending, purple; stigma large, 2-3-lobed. Berries red, 2-3-seeded, obovoid.

Distribution: Cultivated largely throughout the plains of India and Ceylon.

The tuber is dry, acrid, pungent; increases both appetite and taste; stomachic, constipating; useful in piles, enlargement of the spleen, tumours, asthma, bronchitis, vomiting, abdominal pain, blood diseases, elephantiasis; causes itching, sensation; harmful in "kapha", leprosy, leucoderma (Ayurveda).

The corm and the seeds are used as irritants and relieve the pain of rheumatic swellings when applied externally. The corm is considered a hot carminative in the form of a pickle. The tuber contains a large quantity of farinaceous matter, mixed with acrid poisonous juice, which may be extracted by washing or heat. When fresh, it acts as an acrid stimulant and expectorant, and is used in acute rheumatism. It is supposed to have restorative powers and is in much request. It is considered serviceable in hæmorrhoids.

The root is used in ophthalmia and applied to boils. It is also used as an emmenagogue.

The raw tuber, well ground, is rubbed on swellings of the extremities by the Mundas of Chota Nagpur.

Bengal: Ol—; *Bombay:* Janglisuran—; *Burma:* Wa—; *Cagayan:* Bagang—; *Cutch:* Janglisuran—; *Deccan:* Kanda—; *Hasada:* Hada, Hatuhada—; *Hindi:* Kanda, Zaminkand—; *Ilocano:* Carot, Corot—; *Jolo:* Bagong—; *Konkani:* Suma, Surna—; *Malayalam:* Karunakarang—; *Marathi:* Suran—; *Naguri:* Halu-hada, Ol—; *Persian:* Zaminkand—; *Sanskrit:* Arsaghna, Arshoghna, Bahukanda, Durnamari, Kanda, Kandala, Kandarha, Kandashurana, Kandi, Kandula, Kandvardhana, Kanthalla, Olla, Rutchyakanda, Sthulakandaka, Sukandi, Suvitra, Tivrakantha, Vatari—; *Sinhalese:* Kidaran—; *Tagalog:* Apon, Pungapung, Tocodlangit—; *Tamil:* Karunaikkalang, Karunaikkilhangu—; *Telugu:* Daradakandagadda, Ghemikanda, Kanda, Kandagodda, Manchikanda, Potikanda—; *Visayan:* Anto, Oroy, Pamangquilon, Pungapung, Tocodlangit—.

2. **Amorphophallus prainii** Hook. f. Fl. Brit. Ind. VI, 516.

Tuber 15 cm. across or more. Leaf-petiole 0.6-1.8 m. tall, stout, green, marbled white, blade light green, 1.2 m. across; leaflets 4 to 8, on each branch, lanceolate caudate, 12.5 cm. long, 5 cm. wide. Peduncle 7.5 cm long, thick, mottled like petiole, with large pink sheaths. Spathe tube 5-7.5 cm. long, pinkish outside, inside lemon yellow, deep maroon purple at the base, limb ovate, broad blunt, 20 cm. across, yellow. Spadix as long; appendage 5 cm. long, 3.8 cm. through, greyish white. Male portion 2.5 cm. long. Stamens numerous, crowded, white. Female flowers in 3 or 4 spirals, crimson; style stout; stigma bilobed. Drupes 6 mm. long, elliptic, red.

Distribution: Malay Peninsula.—Sumatra.

The acrid juice is used as a poison by the Malays.

Malay: Likir, Lokie—; *Sakai:* Begung—.

SYNANTHERIAS Schott.

Characters of AMORPHOPHALLUS, but male and female inflorescence distant, with oblong depressed interposed neuters.—Species 1.—S. India, Ceylon.

1. **Synantherias sylvatica** Schott Gen. Aroid. (1858) t. 28.—*Arumsylvaticum* Roxb.; Wight Ic. t. 802.—PLATE 1000.

Tuber 2.5-6.3 cm. diam. Leaves long-petioled, 30 cm. broad or less, leaflets few, ovate-lanceolate or oblanceolate, acuminate or caudate, 12.5-15 cm. long, lower on the divisions smaller, petiole 15-45 cm., pale green, streaked with darker. Pedicel up to 20 cm. long, pink clouded with dirty green, basal sheaths short, scarious, pale pink. Spathe 2.5-7.5 cm. long, pale pink spotted with green, purple within towards the base. Spadix up to 25 cm. long, erect, appendage up to 18 cm. by 2 cm. diam., but often more slender, sometimes tapering from the middle to base and apex, purple, smooth; anthers in groups of 4-6, minute, purple or pale pink, ovary green, stigma yellow; neuters as large as the groups of stamens or larger, oval or oblong, disciform, pale, shining.

Distribution: Deccan Peninsula, from the N. Circars to the Konkan, Ceylon.

The plant is pungent, anthelmintic, heating; improves taste; useful in tumours, pains, piles; causes biliousness (Ayurveda).

The country people use the crushed seed to cure toothache. A small quantity is placed in the hollow tooth and covered with cotton; it rapidly benumbs the nerve; they also use it as an external application to bruises on account of its benumbing effect. In the Konkan, the seeds rubbed into a paste with water are applied repeatedly to remove glandular enlargements. The taste of the fruit is intensely acrid; after a few seconds it causes a most painful burning of the tongue and lips, which lasts, for a long time, causing much salivation and subsequent numbness.

Goa: Uzomut—; *Marathi:* Wajramuta—; *Sanskrit:* Aranyasurana, Chitrakandaka, Shvetasurana, Sitasurana, Surendra, Vanja, Vanakanda, Vanaolla, Vanya—.

PLESMONIUM Schott.

Characters of AMORPHOPHALLUS, but male and female inflorescence distant, with large obovoid pearl-like or turbinate neuters interposed, and no appendage.—Species 1.—India.

1. **Plesmonium margaritiferum** Schott Syn. 34.—*Arum margaritifer* Roxb.; Wight Ic. t. 795.—PLATE 1001.

Tuber 15 cm. diam. or less, bulbilliferous all over. Leaves 45 cm. diam., 3-sect; segments pinnatisect, lateral forked; leaflets few, 10-15 cm., linear, acuminate; petiole 45-60 cm., green. Peduncle 30-45 cm., stout, pale green streaked with darker green. Spathe 12.5-15 by 10 cm. broad, erect, broadly ovate, obtuse, concave, loosely convolute below the middle, pale yellow-green, flushed with pink within, dark purple at the base. Spadix very stout, stipitate, obtuse, as long as the spathe; male inflorescence much the longest; neuters as large as peas, white. Anthers crowded, very short, pores confluent. Ovaries scattered, globose, narrowed into a short style; stigma large, 2-3-lobed.

Distribution: Bengal.

The country people in Goa use the crushed seed to cure toothache; a small quantity is placed in the hollow tooth and covered with cotton; it rapidly benumbs the nerve; they also use it as an external application to bruises on account of its benumbing effect.

Among the Mundas the raw tuber, well ground, is rubbed on swellings of the extremities.

Biru: Bonggajorena—; *Goa:* Azomut, Uzomut—; *Hasada:* Birhada, Hada—; *Naguri:* Hada, Tonanghada—.

REMUSATIA Schott.

Tuberous herbs, emitting long leafless bulbilliferous shoots from the crown of the tuber. Leaf solitary, entire, peltate, coming up after the flowers. Flowers monoecious. Spathe coriaceous, shortly stipitate; tube convolute, constricted at the mouth, accrescent over the fruit; limb broad or narrow, erect, or spreading and reflexed, deciduous. Spadix very short, sessile; appendage 0. Male and female inflorescences distant, with interspersed neuters. Male inflorescence forming a clavate mass of densely packed flat-topped anthers mixed with neuters, the individual stamens with a fleshy connective bearing 2-3 small immersed anther-cells opening by terminal slits. Female inflorescence short, cylindric. Ovaries closely packed, ovoid, 1-celled; ovules many, on parietal placentas, orthotropous; stigma sessile, discoid. Fruit of small clustered berries. Seeds small; albumen copious; embryo axile.—Species 2.—Tropical Africa and Indo-Malaya.

Therapeutically the genus is of doubtful value.

1. **Remusatia vivipara** Schott Melet. I (1832) 18.—*Arum viviparum* Roxb. Hort. Beng. (1814) 65; Wight Ic. t. 798.

Tubers 2.5-3.8 cm. diam., clustered, depressed, rooting from the crown; bulbilliferous shoots 15-30 cm. long, as thick as a goose-quill, simple or shortly branched, ascending, flexuous, bearing at the nodes clusters of oblong, squarrosely scaly bulbils 2.5-6 mm. long. Leaves peltate, 12.5 by 9 to 45 by 30 cm., membranous, orbicular-ovate or cordate, acute or acuminate, with strong main nerves and fine venation between them; petiole 15-30 cm. long, with a short sheath. Spathe 10-12.5 cm. long, coriaceous; tube 2.5-5 cm. long, oblong or ovoid, green; limb 5-7.5 cm. long, broadly orbicular-ovate or ovate-cordate, 5-7.5 cm. broad, golden yellow. Spadix 2.5-3.8 cm. long; the male inflorescence 6 mm. long. The plant rarely flowers, but sends up long bulbilliferous shoots from the crown of the tuber.

Distribution: Subtropical Himalaya, Khasia Hills, Burma, Chota Nagpur, Bombay Presidency, Mysore, Ceylon.—Cochin-China, Java, Tropical Africa.

The root is made into an ointment with turmeric and used as a remedy for itch; and the juice with cow's urine is considered to be alexipharmic (Rheede).

Marathi: Rukhalu—.

Colocasia Schott.

Tall herbs, tuberous or with a stout short caudex, flowering and leafing together. Leaves with a stout petiole; lamina peltate, ovate-cordate or sagittate-cordate. Spathe with a stout peduncle; tube ovoid or oblong, convolute, accrescent in fruit, finally irregularly lacerate; lamina oblong or narrowly lanceolate, deciduous. Spadix shorter than the spathe, stout or slender; female inflorescence short, male inflorescence long, cylindric, usually interposed neuters between the two. Appendix erect, elongate-conical or fusiform, subulate or abbreviate, mucroniform. Male flowers 3-6-androus. Female flowers 3-4-gynous; ovary ovoid or oblong, 1-locular; ovules several or many, biseriate; style 0 or short in the beginning, later on 0; stigma depressed-capitate, very shortly 3-5-sulcate. Berries obconic or oblong, many-seeded. Seeds oblong, sulcate. Albumen copious; embryo axile.—Species 7.—Tropical Asia.

Rubefacient, styptic and vulnerary.

C. esculenta Schott is used medicinally in China and in Brazil.

1. **Colocasia esculenta** (Linn.) Schott Melet. I (1832) 18.—*C. antiquorum* Schott. l. c.—PLATE 1002 (under *C. antiquorum* Schott.)

Stem above ground 0, or slightly swollen at the base of the leaf-sheaths, arising from a hard tapering rhizome or in cultivated forms a tuberous rhizome, suckers and stolons sometimes present. Petiole erect, up to 1.2 m. long; lamina thinly coriaceous, peltate-ovate, cordate at the base, up to 50 cm. long, rarely longer with a triangular sinus cut one-third to half way to petiole, with a dull, not polished surface above, paler or coloured beneath, but rarely very glaucous. Peduncle much shorter than the petiole; spathe pale yellow, 15-35 cm. long; tube greenish, oblong; lamina narrowly lanceolate, acuminate, convolute, never widely open, curved slightly backwards in flower. Spadix much shorter than the spathe, rather slender. Female inflorescence as long as the sterile male inflorescence. Appendix much shorter than the inflorescence, style very short. Stigma discoid.

Distribution: Wild and cultivated throughout the hotter parts of India and Ceylon.—Cultivated in all hot countries.

The pressed juice of the petioles is styptic, and may be used to arrest arterial hæmorrhage. It is sometimes used in earache and otorrhœa, and also as an external stimulant and rubefacient. The juice expressed from the leaf stalks is used with salt as an absorbent in cases of inflamed glands and buboes. The juice of the corm is used in cases of alopaecia. Internally, it acts as a laxative, and is used in cases of piles and congestion of the portal system, also as an antidote to the stings of wasps and other insects.

The corm is used by the Mundas as a remedy for bodyache.

The juice of the corm has no value in the symptomatic treatment of scorpion-sting (Caius and Mhaskar).

Angami Naga: Dzu, Kirth—; *Annam:* Khoai nuoc—; *Arabic:* Kalkas, Kur, Qulqas—; *Ashanti:* Kooko—; *Bengal:* Ashukuchu, Bunkuchu, Charkuchu, Guri, Kachu, Kalokuchu, Kuchu—; *Bombay:* Kachualu, Terem—; *Brazil:* Tayoba de Sao Thome—; *Burma:* Mahuyapein—; *Cagayan:* Gabi—; *Canarese:* Kesavedantu, Keshavanagadde, Shamegadde—; *Chinese:* Yu, Yu T'eou—; *Deccan:* Arvi, Chamkurekagaddah—; *English:* Coco, Eddoes, Egyptian Arum, Kopeh, Scratch Coco, Taro—; *Fanti:* Kooko—; *French:* Chou caraïbe, Colocase, Colocasie, Gingembre d' Egypte—; *Gold Coast:* Coco Yam—; *Hausa:* Gwaza, Koko Yam—; *Hindi:* Arvi, Arwi, Ashukachu, Auri, Avois, Ghoya, Ghuiya, Ghuya, Ghwiya, Gorikachu, Kachu—; *Japanese:* Imo—; *Kangra:* Arbi, Gandiali, Kachalu—; *Konkani:* Allum—; *Languedoc:* Farrao—; *La Reunion:* Songe du pays, Sonze de Chine, Sonze de Maurice, Sonze noire, Sonze du pays—; *Malay:* Keladi china, Keladi hudang, Keladi telor—; *Malayalam:* Chempakizhanna, Kaladi—; *Malta:* Aro di Egitto, Coco, Cocoaroot, Colocasia, Ghorghas—; *Marathi:* Alu—; *Mexico:* Quequexquic— *Mundari:* Birsaru, Kucusaru—; *New Caledonia:* Barenik, Coboue, Dadi, Diali, Diamboilate, Doboua, Jabouak, Jalape, Kandie, Kandieren, Kave, Kiamoan, Nere, Ouagape, Ouaoua, Oumon, Ounegate, Paricraoute, Pobo, Tanmaoute, Taro, Tianaboue, Tiaoune, Tirene—; *Pampangan:* Gabi, Gandus, Gavay, Lagway—; *Philippines:* Badiang, Dagmay—; *Punjab:* Alu, Gagli, Ghuyan, Givian, Kachalu, Kasauri, Rab—; *Sadani:* Bonsaru—; *Sanskrit:* Kachchi, Kachu, Kachwi—; *Sinhalese:* Gahala, Habarala, Kandala, Tadala—; *Spanish:* Aro de Egipto, Name de Canarias, Name de Egipto, Yame de Canarias, Yame de Egipto—; *Tagalog:* Gabi, Gabingpola, Gabingsilangan, Gabynasiboyas, Gabynasiniboyas, Gandus, Gavay, Lagvay—; *Tamil:* Shamakkilangu, Shemakkalenga—; *Telugu:* Chamadumpa, Chamagadda, Chamakura, Chamakuru, Chema, Shamathumpa—; *Twi:* Kooko—; *Uriya:* Saru—; *Visayan:* Abalong, Apipi, Biga, Dagmayngaapipi, Dagmaynga bolilao, Dagmayngainitlog, Dagmayngaquinson, Dagmayngatapol, Gabi, Gabingmorada, Ganyngaguinatos, Galiang, Gandus, Gavay, Guinatos, Lagvay, Quimpoy—; *Yoruba:* Koko—.

ALOCASIA Schott.

Characters of COLOCASIA, but ovules few, basilar, erect.—Species 45.—Tropical Asia.

1.	Leaves broadly ovate-cordate, repand, nerves 5-6 pairs	3. *A. montana.*
2.	Leaves large ovate, deeply saggitately cordate, repand	1. *A. indica.*
3.	Leaves triangular-saggitate, shortly acuminate, about $\frac{1}{3}$ as broad as long	4. *A. denudata.*
4.	Leaves broadly ovate-saggitate, repand; basal lobes rounded, connate for $\frac{1}{10}$ their length	2. *A. macrorrhiza.*

Mild laxative and diuretic.

A. macrorrhiza Schott is used medicinally in China; *A. singaporensis* Lindl. is used as a poison in Malaya.

1. **Alocasia indica** Schott in Oestr. Bot. Wochenbl. (1854) 410.—*Arum indicum* Roxb.; Wight Ic. t. 794.—PLATE 1003.

A robust herb with caudex attaining 0.9-1.8 m. and 10-20 cm. diam. Leaves 60-90 cm. long, bright green, triangular-sagittate slightly repand, endlobe triangular-acute, with strongly marked whitish midrib and 6-8 strong pale secondary nerves each side spreading at an angle of 60-70° from the midrib and slightly ascending towards the margin; basal lobes ovate with rather a narrow sinus between and sometimes shortly confluent, their primary nerves forming an acute or nearly a right angle with each other. Petiole as long as or longer than the leaves, round and tapering upwards, sometimes transversely clouded. Peduncles several, 10-20 cm. long. Spathes with slight, rather offensive smell, 20-30 cm. long, of a pale greenish yellow inside and out, tube oblong-ovoid 3.8-5 cm. long, limb 15-23 cm. long by 5-6 cm. broad, narrowly oblong with a small subulate cusp. Female inflorescence yellow, narrowly ovoid, about 2.5 cm. long; fertile male inflorescence white 3.8-5 cm. long, appendix conoid rugulose 10-12.5 cm. long and 7.5-10 mm. broad. Pistil obovoid, about 5 mm. long with sessile 3-4-lobed stigma. Berry red, 7.5-10 mm. diam.

Distribution: Cultivated in Indian gardens.—Cultivated in the tropics.

The rootstock is pungent, fragrant, cooling; useful in inflammations, leprosy, anasarca, diseases of the abdomen and spleen (Ayurveda).

Medicinally it is said to be useful in anasarca. The flour obtained by pounding the dried stems boiled with rice flour until all the water has evaporated, is given to the patient and no other food allowed.

As a food taken frequently, it seems to act as a mild laxative and diuretic. In piles and habitual constipation it is useful.

The ash of the root-stocks mixed with honey is used in cases of aphthae.

The juice of the fresh petiole has no action in the symptomatic treatment of scorpion-sting (Caius and Mhaskar).

Lal Mohan Ghoshal has studied the use of manmanda in Indian therapeutics and its probable explanation (*Foods and Drugs;* April 1913).

Assam: Mankachu—; *Bengal:* Mankachu—; *Betsimisaraka:* Saombia—; *Canarese:* Manaka—; *Goa:* Cureas—; *Hindi:* Mankanda—; *Marathi:* Alu—; *Philippines:* Elephant's Ears—; *Sanskrit:* Brihachhada, Chhatrapatra, Mahapatra, Mana, Manaka, Sthalapadma, Vistirnaparna—; *Tagalog:* Badiang, Gabingonac—; *Visayan:* Badiang—.

2. **Alocasia macrorrhiza** Schott in Oestr. Bot. Wochenbl. (1854)409.—*A. odorum* Roxb.; Wight Ic. t. 797.

The largest of our terrestrial aroids, forming a considerable aerial stem often 1.2 m. high (attains a much greater size in some provinces) and 5-10 cm. diam. more or less clothed with aerial roots. Leaves broadly ovate-sagittate repand, 60-120 cm. long and 45-90 cm. broad, deeply cordate, with the basal lobes shortly connate or for about one-tenth of their length and sinus narrow. Spathe 15-25 cm. long with the tube about half as long as the coriaceous-hooded cymbiform cuspidate pale green limb. Spadix nearly as long as spathe and appendage nearly as long as the flowering part, sinuously sulcate. Ovary incompletely 4-celled.

Distribution: Tropical and subtropical India, wild and cultivated.—Cultivated in the tropics generally.

The root is a mild laxative and diuretic.

Chinese: Hai Yu—; *New Caledonia:* Alendiete, Baouen, Diamote, Ouagan, Pera, Taro—; *Sinhalese:* Habarala—.

3. **Alocasia montana** Schott in Oestr. Bot. Wochenbl. (1854) 140.

Caudex a short cylindrical tuber up to 5 cm. diam. Leaves somewhat coriaceous broadly cordate-ovate, polished, 15-20 cm. long and nearly 15 cm. broad, shortly apiculate at the obtuse apex, basal lobes only about one-fourth as long as the broadly ovate terminal lobe with an almost circular sinus between, secondary nerves 3 on each side almost from the base, 4-5 secondary nerves higher up ascending within the margin and uniting in an intra-marginal nerve. Petiole stout 20-25 cm. Peduncles several, about 20 cm. long. Spathe cucullate, coloured with oblong tube 2.5-3 cm. and limb nearly 10 cm., acute. Spadix nearly as long, neuter inflorescence rather suddenly thickened at the base, conoid, acute towards the apex and 5-6.3 cm. long.

Distribution: N. Circars.—Java.

The root is said to be used to poison tigers. (Roxburgh).

4. **Alocasia denudata** Engl. Araceae 507; Hook. f. Fl. Brit. Ind. VI, 525.—*A. singaporensis* Linden Garten-Fl. XIV, 292.

Stem 5 cm. long. Leaves 1-3; petioles 38-60 cm. long, 13 mm. through, marbled transversely with grey, blade hastate, lobes divaricate, blunt or subacute, over 30 cm. long, 23 cm. wide, dark green, veins paler, occasionally purple beneath. Spadices 1 to several; peduncles 15-30 cm. long, marbled grey. Spathe 10-15 cm. long, tube 2.5-3.8 cm. long, swollen, limb pale green or white, oblong cuspidate at length reflexed, 12.5 cm. long, 2.5 cm. wide. Spadix 9-10 cm. long. Appendage cylindric, 3.8 cm. long, pale ochre or orange. Male part 13 mm. long, white; flowers oblong, crenulate; stamens 6. Neuter portion 6 mm. long, white or orange. Female portion cone-shaped, 13 mm. long, stigmas 4-horned, sessile. Fruit globose, red, 1-3-seeded. Seeds black, subglobose, 3 mm. long,

Distribution: Malay Peninsula.—Lingga, Borneo.

The acrid juice is used as a poison by the Malays.

Malay: Keladi chandek, Keladi riman, Keladi ular—.

HOMALOMENA Schott.

Herbs, rhizome stout or 0. Leaves entire very variable in shape. Spathe usually erect, convolute, wholly persistent round the fruit. Spadix included; male and female inflorescences close together, cylindric; ovaries with or without clavate staminodes. Stamens distinct, in dense groups; anther-cells very short or oblong opening by pores or slits; connective thick. Ovaries ovoid or globose, perfectly or imperfectly 2-4-celled, stigma sessile; ovules 2-seriate or the placentas anatropous or ½-anatropous. Berries few- or many- seeded. Seeds small, ovoid, albuminous. Embryo axile.—Species 80.—Asia and S. America.

1. Basal lobes of leaves divaricate .... 1. *H. aromatica.*
2. Basal lobes of leaves semiovate or rounded approximate ...... 2. *H. rubescens.*

H. rubescens Kunth is used in Malaya for the preparation of ipoh.

1. **Homalomena aromatica** Schott Melet. I, 20.—*Calla aromatica* Roxb.; Wight Ic. t. 805.—PLATE 1004.

Root, the body or tuber is a continuation of the stem when the plants are old enough to have one, invested in the old withered sheaths of the leaves, with numerous, long, white, fibrous cords issuing from every part. Stem short and of a slow growth. Leaves radical, long-petioled, shape between cordate and sagittate, accuminate, lucid: lobes rounded and rather remote from each other, general length about 30 cm., and a little more than half of that in breadth. Petioles with a sheathing base, and smooth, as in the order. Flowers many together from the axils and centre of the leaves, their whole length, scape included, scarcely half the length of the petioles, the usual bracts intervene between the round, smooth, uniform, green scape. Spathe subcylindric, rather obtuse, with an acumen smooth on both sides, of a pale greenish yellow. Spadix subcylindric, obtuse, equalling, or rather longer than the spathe; the upper two-thirds covered with sessile, many-celled anthers; the lower third with the ovaries intermixed with about as many abortive stamina as there are ovaries. Ovaries ovate, seemingly two-, or three- celled. Style none. Stigma two- or three- lobed. Berries oblong, not unlike a large berberry, and rarely containing more than a single seed.

Distribution: Assam, Chittagong.

The large rhizome, which is invested with the old withered leaf-scales, bears numerous white long rootlets issuing from its surface, and is said to be held in high estimation by the natives as an aromatic stimulant.

Bengal: Kuchugundubi—.

2. **Homalomena rubescens** Kunth Enum. III, 57.—*Calla rubescens* Roxb. Fl. Ind. III (1832) 515; Wight Ic. t. 807.

Caudex short, rooting, 2.5 cm. diam. Leaves 15-30 cm., cordate or sagittately cordate acuminate, usually tinged with red, basal lobes semiovate or rounded, approximate, much shorter than the anticous, sinus narrow, subacute or rounded at the red petiole, which is longer than the leaf, and sheathing for $^1/_3$ its length. Peduncles several, 7.5-10 cm., stout. Spathes red, 7.5 cm., oblong, acute at base and top.

Distribution: Sikkim Himalaya and Khasia Hills, Chittagong.—Java.

The plant is used as a poison by the Malays. It enters into the composition of 'ipoh' and is thrown into rivers to poison the water

SCINDAPSUS Schott.

Stout climbing aroids with the characters of Rhaphidopnora but the one-celled ovary has a single basilar ovule and the seed is exalbuminous.—Species 20.—Indo-Malaya.

The genus is therapeutically inert.

1. **Scindapsus officinalis** Schott Melet. I, 21.—*Pothos officinalis* Roxb. Fl. Ind. I (1832) 431; Wight Ic. t. 778.—PLATE 1005.

Stem as thick as the little finger; branches wrinkled when dry. Leaves dark green, 12.5-25 by 6.3-15 cm., ovate, elliptic-ovate, or nearly orbicular, caudate-acuminate, base rounded or slightly cordate, primary nerves distinct, petiole 7.5-15 cm. broadly winged up to the knee. Peduncle solitary, terminal, much shorter than the petiole; spathe about 10-15 cm. long, oblong, subcylindrical, slender-beaked, green without, yellow within; spadix equalling the spathe, elongating in fruit, greenish yellow. Stigma elongate; fruiting hemispheric. Berries, few only ripening fleshy. Seed ovate-cordate. Fruiting spadix sometimes a span long.

Distribution: Tropical Himalaya, from Sikkim eastwards, Bengal, Chittagong, Burma, Andaman Islands.

The fruit is pungent, sharp; heating, appetiser; anthelmintic, aphrodisiac, galactagogue; sharpens the hearing, regulates the bowels; useful in dysentery, asthma, troubles of the throat (Ayurveda).

The fruit is aphrodisiac, cardiotonic; useful in ozoena, bronchitis (Yunani).

The dried fruit is a stimulant, diaphoretic, and anthelmintic.

Among the Santals the fruit is applied externally for rheumatism (Campbell).

A decoction of the sliced fruit was tried in cases of asthma and found to act as an expectorant; it did not diminish the severity of the fit (Koman).

The juice of the plant is not an antidote to either snake venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Bengal: Gajapipal, Gajapipul—; *Canarese:* Doddahippali, Gajahippali—; *Deccan:* Hattipipli—; *Dehra Dun:* Poriabel—; *Gujerati:* Mottopiper—; *Hindi:* Braipipli, Gajapípal, Gajapipli, Maidah, Pippaljhhanca—; *Malayalam:* Anattippali, Attittippali—; *Marathi:* Thorapimpli—; *North-West Provinces:* Gajpippali, Hath, Ungliya—; *Sanskrit:* Chavyaphala, Chhidravaidehi, Dirghagranthi, Gajakrishna, Gajapippali, Gajavha, Ibhakana, Ibhoshana, Kapivalli, Karipippali, Kolavalli, Kunjarapippali, Shreyasi, Tejasi, Vartuli, Vashira—; *Santali:* Darejhapak—; *Tamil:* Anaittippili—; *Telugu:* Enugatippali, Gajapippali—; *Urdu :* Gajapippali—; *Uriya:* Girudhuni, Gojopippoli, Odisimo—.

RHAPHIDOPHORA Schott.

Suffruticose climbers clinging by their adventitious roots, with distichous usually large, entire or pinnatifid leaves with many primary nerves and branching secondary nerves; petiole geniculate at the tip. Spathe coriaceous, ovate, acuminate, deciduous. Spadix sessile above the spathe, stout. Flowers crowded 2-sexual, perianth 0, stamens 4-6 with very short flattened filaments and terminal anthers. Ovary obconic, truncate, with small sessile linear stigma. Ovules many parietal. Berries many-seeded and confluent, their tissue loaded with intercellular raphides. Seeds albuminous. Embryo axile.—Species 60.—Indo-Malaya.

R. giganteum Schott is used as an arrow-poison in Malaya.

1. **Rhaphidophora pertusa** Schott in Bonpland. V (1857) 45.—*Pothos pertusa* Roxb. Fl. Ind. 1, 434; Wight Ic. t. 781.—*Scindapsus pertusus* Schott Melet. I, 21.—PLATE 1006.

Stem climbing the highest tree-trunks, cylindric, 3.8 cm. diam., green, smooth, leafy for the greater part of its length. Leaves 20-45 by 15-25 cm., broadly ovate or ovate-cordate, cuspidate, dark green, entire or sparingly lobed, primary veins 5-8 pairs, connected by anastomosing veinlets, petiole about as long as the blade, deeply channelled, young winged, wings not auricled at the top, basal sheaths 4-5, oblong, obtuse, brown. Spathe shortly stoutly peduncled, 12.5-18 cm., ovate-oblong or cylindric, cymbiform, acuminate or cuspidate, yellow. Spadix sessile, shorter than the spathe, very stout, cylindric, 17 mm. diam., top rounded. Flowers hexagonal; stamens 8, filaments very stout, sometimes bifid, anther small; ovary 6-gonous, stigma linear, raised on a short stout style.

Distribution: Deccan Peninsula, Coromandel Coast, Malabar and southwards to Ceylon.—Malay Islands.

The juice of the plant with black pepper is given to people who are bitten by the Russell's Viper. The juice, with that of the roots of *Croton oblongifolium*, and of the fruit of *Momordica charantia* is also applied to the bitten part.

This treatment is ineffective (Mhaskar and Caius).

Jolo: Mamao—; *Malayalam:* Anachukiri, Ilattimaravala—; *Marathi:* Ganeshkanda—; *Tagalog:* Pacpaclauin—; *Tamil:* Ilattimaravalai—; *Telugu:* Enuganalleru—; *Visayan:* Dayia—.

LASIA Lour.

A stout spinous marsh plant; rhizome branched and petiole peduncle and leaf-nerves beneath all prickly. Leaves long-petioled, hastate, entire or pedately pinnatifid. Spathe very long, narrow, fleshy, twisted, base convolute, deciduous. Spadix short, cylindric, dense-flowered, flowering downwards. Sepals 4-6, obovate, tips truncate incurved. Stamens 4-6, filaments short, flat; anther-lobes parallel, slits extrorse. Ovary ovoid, 1-celled, 1-ovuled; style stout; stigma depressed; ovule pendulous from the top of the cell, anatropous or semi-anatropous. Berries obpyramidal, 6-sided, top warted or muricate. Seed compressed, rugose, exalbuminous: embryo macropodal.—Species 2.—Indo-Malaya.

The therapeutic properties are not clearly defined.

1. **Lasia heterophylla** Schott Melet. 21.—*Pothos heterophylla* Roxb.; Wight Ic. t. 777.—PLATE 1007.

Rootstock creeping, 2.5 cm. diam. Leaves 15-45 cm. long, rigidly coriaceous, young hastate or sagittate, old pinnatifid, segments lanceolate, acuminate, smooth above, beneath costate, and strongly penniveined, midrib and veins naked or spinous beneath, petiole 60-120 cm., terete, base sheathing. Spathe 20-35 cm., spirally twisted above the spadix, about as thick as the little finger, acute, green or yellowish, margins very dark purple except at the base, open at the base only when the pollen is being discharged, closing afterwards. Spadix about 2.5 cm., claret-coloured, fruiting 10-12.5 cm. and 2.5 cm. diam. Flowers sessile, perianth-segments 4-5, concave, dorsally hooded, dull pink; filament very broad, anther-cells oblong, divaricate below; ovary short, columnar, green, stigma large, sessile, pulvinate, pink. Fruit an oblong or capitate syncarp 5 cm. diam., of muricate berries 13 mm. diam.

Distribution: From tropical Sikkim Himalaya, Assam, Bengal and Burma, southwards to Ceylon and Malay Peninsula.—Malay Islands, China.

The root is highly esteemed by the Santals as a remedy for affections of the throat (Campbell).

Among the Mundas the petioles, ground and mixed with water, are given to drink to cattle affected with throat disease

The leaves and roots are a common remedy for piles in Ceylon.

Bengal: Kantakachu—; *Burma:* Zayap—; *Malay:* Bekil, Gli-gli—; *Mundari:* Janumsaru—; *Santal:* Rantasaru—; *Sinhalese:* Kohilla, Mahakshilla—; *Telugu:* Kantakachoramu, Mulasari—.

POTHOS Linn.

Evergreen branching shrubs, climbing by aerial roots. Leaves distichous, obliquely linear to ovate, the blade sometimes obsolete; petiole winged or leaf-like sheathing at the base. Flowers hermaphrodite, all fertile. Peduncles axillary or infra-axillary, leafy, or sheathed, or naked. Spathe small, ovate or concave, coriaceous, persistent. Spadix shorter than the spathe, stipitate. Perianth of 6 segments with hooded tips. Stamens 6; filaments short or long, linear or dilated; anthers terminal, dehiscing by extrorse chinks. Ovary ovoid, oblong or depressed, 3-celled; ovule solitary in each cell, anatropous, adnate to the inner angle; stigma small, sessile, hemispheric. Berries ellipsoid, often compressed; testa thick; albumen 0; embryo macropodal.—Species about 60.—Indo-Malaya, Madagascar.

1. Leaves 5-10 cm., obovate or lanceolate ……………………	1. *P. scandens.*
2. Leaves 7.5-15 cm., ovate-oblong or lanceolate, acute or acuminate …………………………………………	2. *P. cathcarti.*

The genus is therapeutically inert.

1. **Pothos scandens** Linn. Sp. Pl. (1753) 968.

A climbing plant clothing trees and walls like ivy; stem as thick as the little finger, much-branched, tough, terete, smooth, leafy; internodes 1.3-2.5 cm. long. Leaves very variable, 5-10 by 0.8-5 cm., obovate, elliptic or lanceolate, acute, acuminate or apiculate, coriaceous, bright green, base cuneate or rounded; petiole broadly winged, 2.5-7.5 cm. by 6-17 mm., the base ½-amplexicaul. Peduncles 5-10 mm. long, the base clothed with ovate acute imbricating cataphylls about 4 mm. long. Spathe 4-6 mm. long, cymbiform, cuspidate, green. Spadix yellow, as long as the spathe, stipitate, globose, ovoid, or shortly oblong, the stipes as long as the inflorescence. Anthers terminal, minute, the cells divaricate. Ovary 3-celled, truncate; stigma minute, lobulate. Berries 13-17 mm. long, oblong, scarlet, few ripening.

Distribution: Throughout India, Ceylon.—Malaya Islands, China.

In Malaya, the powdered leaves are applied to the body to cure small-pox: the stem cut up with camphor is smoked like tobacco for asthma.

The bruised stem and leaves are mixed with ox-urine and applied to the wounds in snake-bite; and an aqueous extract of the fresh stem and leaves is given internally (Roberts).

The stem and leaves have no effect in the treatment of snake-bite, whether taken internally or applied externally (Mhaskar and Caius).

Badaga: Arkaburu—; *Canarese:* Adikabiluballi—; *Malay:* Juloh-juloh—; *Malayalam:* Anapparuva—; *Sinhalese:* Potawel—.

2. **Pothos cathcarti** Schott Aroid. I, 22, t. 44, 45.

An evergreen climber with dark green, smooth, terete, woody stems which attain 18 m. high and 15 mm. diam. Internodes 1.3-3.8 cm. long. Leaves alternate, 9-18 by 3.2-5 cm., oblong or ovate-oblong, acuminate, base rounded, dark glossy green above, pale and glossy beneath, thick, nerves indistinct. Petiole 2-10 cm. long, winged on either side to form a leaf-like expansion 7.5-25 mm. broad at the broadest part, slightly widening upwards and rounded at the top. Peduncle solitary, axillary, 1.3-1.8 cm. long below the spathe, partly hidden by 4 or 5 imbricating bracts. Spathe suborbicular, cordate, cuspidate, the edges incurved, 13-15 mm. across, green usually tinged with purple. Stipe 5-7.5 mm. long terminating in an ellipsoid, yellow, fleshy, many-flowered spadix 7.5-13 mm. long. Berries scarlet, 13-18 mm. long.

Distribution: Tropical Himalaya from Kumaon to Bhutan, Assam, Khasia Hills, Manipur, Burma.

In Lakhimpur, the leaves, fried in ghee, are eaten to cure various pains (Carter).

Lakhimpur: Hathidenkiya—.

ACORUS Linn.

Aromatic marsh herbs, rootstock creeping. Leaves distichous, ensiform, base equitant, nerves parallel. Peduncle leaf-like. Spathe the ensiform continuation of the peduncle. Spadix sessile, cylindric, dense-flowered, flowering upwards. Sepals 6, orbicular, concave, tips, incurved. Stamens 6, filaments linear flat; anther reniform, cells confluent above, slits extrorse. Ovary conical, 2-3-celled; stigma minute; ovules many, pendulous from the top of each cell, orthotropous. Berries few-seeded. Seeds oblong, micropyle often fimbriate, albumen fleshy, embryo axile.—Species 2.—N. temperate regions, S.-E. Asia.

1. Midrib of leaves stout .... 1. *A. calamus.*
2. Midrib of leaves absent .... 2. *A. gramineus.*

The root is stimulant, tonic, and antispasmodic; it is also used as an insectifuge and insecticide.

A. calamus Linn. and *A. gramineus* Ait. are used medicinally in China, Indo China, and Malaya; *A. calamus* Linn. is also used in Europe and South Africa.

The rhizome of *A. Calamus* Linn. is officinal in Austria, Germany, Holland, Hungary, Italy, Norway, Russia, Sweden, Switzerland; that of *A. Calamus* Linn. (*A. odoratus* Lamk.) in Portugal.

1. **Acorus calamus** Linn. Sp. Pl. (1753) 324.—PLATE 1008.

Rootstock as thick as the middle finger, creeping and branching. Leaves 0.9-1.8 m. by 1.7-3.8 cm., bright green, acute, thickened in the middle, margins waved. Spathe 15-75 cm. long, pedicel (formed of connate pedicel and spathe) 3.8-3.2 cm. broad. Spadix 5-10 by 1.3-2 cm. diam. obtuse, slightly curved, green; sepals as long as the ovary, scarious; anthers yellow. Fruit turbinate, prismatic, top pyramidal.

Distribution: Throughout India and Ceylon, in marshes, wild or cultivated, ascending the Himalayas up to 6,000 ft. in Sikkim.—N. temperate and warm regions.

The rhizome is pungent, bitter, heating; emetic, laxative, diuretic, carminative, anthelmintic; improves appetite, voice, throat; good for diseases of the mouth; useful in abdominal pains, inflammations, fevers, epilepsy, bronchitis, delirium, hysteria, dysentery, tumours, thirst, loss of memory, rat-bite, worms in the ear (Ayurveda).

The rhizome has a very bitter sharp taste; laxative, expectorant, carminative, alexiteric, tonic to the brain, emmenagogue; useful in general weakness, stomatitis, toothache, inflammations, pains in the liver and the chest, kidney troubles, leucoderma (Yunani).

The aromatic rhizome or root-stock is considered emetic in large doses, and stomachic and carminative in smaller doses. It is a simple useful remedy for flatulence, colic, or dyspepsia, and a pleasant adjunct to tonic or purgative medicines. It is also used in remittent fevers and ague by the native doctors, and is held in high esteem as an insectifuge, especially for fleas.

The root has been employed in medicine since the time of Hippocrates. By the moderns it is successfully used in intermittent fevers, even after cinchona bark has failed, and it is certainly a very useful addition to Cinchona. It is also a useful adjunct to bitter and stomachic infusions. It is also much valued by the Manipuris, especially in the treatment of coughs or sore-throats. For this purpose a small piece is chewed for a few minutes.

Bach is commonly used to allay distressing cough. A small piece of the dried root-stock kept in the mouth acts better than many cough lozenges. It produces a warm sensation in the mouth and a beneficial flow of saliva.

The root has been found extremely useful in the dysentery of children, and also in bronchitic affections.

In Ceylon, the rootstock is used in bowel complaints.

The root is supposed by the Chinese to affect the heart and lungs and to be beneficial for cancer. In general, it is taken as a restorative for the body and spirits.

In Constantinople, the root is eaten as a preventive against pestilence.

The Indians of the Hudson's Bay Territory use the root in coughs.

The Europeans of South Africa use the rootstock as a carminative, and as a diarrhœa remedy.

The rhizome is emetic, nauseant, antispasmodic, carminative, stimulant, and insecticide. As an emetic it is more nauseant and depressant than Ipecacuanha, and it is therefore useful in most of the diseases in which the latter is indicated, including dysentery. It is one of the two vegetable drugs in this country which act efficiently as emetics in so small a dose as 30 grains. It should not be used in more than 35 grains, as in 40 grains its action is very violent and obstinate. It is a good remedy in asthma, to relieve which, it should be first used in pretty large or nauseant doses (15 to 20 grains) and then repeated every 2 or 3 hours in smaller or expectorant doses (10 grains) till relieved. Among other diseases which are most benefited by this drug are bronchial catarrh, hysteria, neuralgia, and some forms of dyspepsia. The rhizome can also be used in the form of a tincture or an infusion (Moodeen Sheriff).

A decoction of the root stalk was given to several cases of indigestion and found to be efficacious (Koman).

The rhizome is useless in the antidotal treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

The roots yield an essential oil which has been studied chemically by Sanjiva Rao, Sudborough and Watson (*Journ. Ind. Inst. Sc.*, VIII (A), 1925).

Afrikaans: Kalmoes—; *Annam:* Thach xuong bo, Xuong bo—; *Arabic:* Vaj, Vash—; *Assam:* Bach—; *Bengal:* Bach—; *Burma:* Linhe—; *Canarese:* Baje—; *Chinese:* Che Ts'ang P'ou, Pai Ch'ang, Choui Ts'ang P'ou, Ts'ang P'ou—; *Cutch:* Vekhanda—; *Deccan:* Gandkilakri, Vach—; *Dutch:* Kalmus, Zwanenbrood—; *English:* Sweet Flag—; *French:* Acore, Acore aromatique, Acore vrai, Acori, Acoris, Galanga des marais, Roseau aromatique, Roseau odorant—; *German:* Ackermagen, Deutscher Ingber, Gewuerzkalmus, Kalmus, Karmes, Karmsen, Kaumeles, Kolmas, Magenwurz, Nagenwurz, Schiemen, Schienenzurz, Wechel, Zehrwurz—; *Gujerati:* Gandhilovaj, Godavaj, Vekhand—; *Hindi:* Bach, Ghorbach, Gorbach—; *Italian:* Acoro, Acoro aromatico, Acoro odoroso, Acoro vero, Calamo, Calamo aromatico, Canna odorifera, Erba cannella, Erba di Venere, Erba venerea—; *Jhalawan:* Kull—; *Kashmir:* Vahi—; *Malay:* Deringu, Jeringu—; *Malaya:* Cheong fu—; *Malayalam:* Vashampa—; *Marathi:* Vekhand—; *Norwegian:* Kalmus--; *Pampangan:* Bueng—; *Persian:* Agar, Agreturki—; *Portuguese:* Calamo aromatico, Canna cheirosa—; *Punjab:* Bariboj, Wach—; *Roumanian:* Sperivan—; *Sanskrit:* Bhadra Bhutanashini, Bodhaniya, Galani, Golomi, Ikshuparni, Jalaja, Jatila, Kanga, Kshudrapatri, Lomasha, Mangalya, Rakshoghni, Shadagrantha, Shataparvika, Schleshmaghni, Smarani, Tikshna, Tikshnapatra, Ugra, Ugragandha, Vacha, Vijaya—; *Sinhalese:* Wadakaha—; *South Africa:* Myrtle Flag, Sweet Flag, Sweet Sedge—; *Spanish:* Acoro, Acoro verdadero—; *Swedish:* Kalmus—; *Tagalog:* Lubigan—; *Tamil:* Vashambu—; *Telugu:* Vadaja, Vasa, Wasa—; *Urdu:* Bacha—.

2. **Acorus gramineus** Soland in Ait. Hort. Kew. I (1789) 474.

Rhizome creeping, up to 0.75 cm. diam. The leaves long-produced much beyond the vagina which is 10-15 cm. long, 30-50 cm. long, 2-5 cm. rarely 1 cm. broad, bright green or white-vittate, narrowly linear, towards the apex long and gradually narrowed; midrib scarcely prominent. Peduncle thin, 10-15 cm. long adnate to the spathe along its whole length. Phyllode of the spathe 7-20 cm. long, 2-3 mm. broad. Spadix 5-10 cm. long, 3-4 mm. diam.. yellowish green. Sepals obovate, stamens narrowly linear, slightly longer than the sepals. Ovary ovoid, style very short. Berries obovoid, about 2 mm. long and broad, green, 2-3-seeded. Seeds oblong.

Distribution: Sikkim Himalaya, up to 6,000 ft., Khasia Hills.—China, Japan.

The root has stimulant, tonic, antispasmodic properties, and like the larger calamus is used in China as an insectifuge and insecticide.

Annam: Thach truong bo—; *Chinese:* Ch'ang P'u, Shih Ch'ang

P'u, Shui Ch'ang P'u, Wai Ch'ang P'u—; *Malaya:* Soi cheong phoo—.

ALISMACEAE.

Aquatic or marsh herbs, usually erect, sometimes floating. Leaves radical or clustered at the nodes of floating stems, entire, petiolate, often pellucid-dotted or lineolate. Flowers pedicellate, regular, 1-sexual or hermaphrodite, in umbellate or paniculate whorls, usually white or pink; bracts 3 or more, membranous; bracteoles small. Perianth-segments 6 in 2 series, the 3 outer (sepals) herbaceous, the inner whorl petaloid, rarely obsolete. Stamens 6 or more (rarely 3) hypogynous or perigynous; anthers erect, basifixed, 2-celled, dehiscing by lateral or dorsal longitudinal slits. Carpels 3-6 or more, 1-celled, sessile or stipitate on a flat or raised receptacle; ovules 1 or more in each carpel; placentas on the inner angle (rarely ovule solitary and basal); style long or short (rarely 0) subterminal or ventral; stigma simple. Fruit of small achenes or follicles. Seeds small or minute; albumen 0; embryo straight or conduplicate.—Genera 11. Species 75.—Cosmopolitan.

The Order is acrid and astringent.

SAGITTARIA Linn.

Erect, stemless, usually perennial aquatic herbs. Leaves with long petioles, elliptic, cordate or sagittate. Flowers 1-sexual or polygamous, in paniculate or spicate whorls. Sepals 3, herbaceous, persistent. Petals 3, membranous, deciduous. Stamens in male flowers about 24 with only staminodes in the female flowers, or 6-10 in the male flowers with 9-12 in the hermaphrodite; filaments filiform, compressed. Carpels very many, crowded on a large globose or oblong receptacle, flattened laterally. Ovary solitary, basal; style ventral or apical; stigma papillose. Fruit a globose or oblong head of flattened crested or winged achenes. Seed erect, basal; testa thin; embryo horseshoe-shaped.—Species 33.—Temperate and tropical.

The genus is astringent.

S. sagittifolia Linn. and *S. sagittifolia* Linn. var. *sinensis* Mak. are used medicinally in China; *S. brasiliensis* Mart., *S. palaefolia* Nees and Mart., and *S. rhombifolia* Cham. in Brazil.

1. **Sagittaria sagittifolia** Linn. Sp. Pl. (1753) 993; Reich. Fl. Germ. VII, t. 53.

Rhizome thick, tuberous, stoloniferous. Leaves radical, 5-20 cm. long, very variable, the first leaves of the young plants very slender and very acute, the next one or two simply cordate-oblong, the rest sagittate, acute, smooth, with more or less divergent basal lobes which are 2-3-nerved and narrower than the upper part of the blade, which latter is oblong or lanceolate, acute, 5-nerved, the nerves extending from the top of the petiole to the apex of the leaf; petioles sometimes reaching nearly 60 cm. long, 3-gonous. Scape 15-45 cm. long. Flowers 13-20 mm. diam., white, often with a purple claw, in 3-5 whorls along the scape with 3-5 (usually 3) flowers in each whorl, the lower whorls female, the upper male, with longer pedicels (hermaphrodite flowers occur sometimes, but rarely); bracts narrowly ovate, membranous. Sepals ovate, acute, much smaller than the petals. Petals large, broadly obovate. Filaments in the male flowers very many, absent in the female flowers; anthers sagittate. Achenes obliquely obovate, flattened, apiculate, winged, the wings broad, entire or subcrenate.

Distribution: Throughout the plains of India.—Europe, N. Asia, N. America.

The plant is used in China to induce the flow of lochia, in retention of the placenta, and in skin diseases.

Bengal: Chotokut, Muyamuya—; *Chinese:* Tse Hsieh—; *English:* Arrowhead, Water Plantain—; *French:* Flèche d'eau, Fléchière, Sagette, Sagittaire—; *Italian:* Sagittaria—; *Languedoc:* Flecho d'aigo—; *Mundari:* Huringdemdem—; *Sadani:* Ciariara—.

CYPERACEAE.

Perennial (rarely annual) herbs with the habit of grasses; roots fibrous; stem terete or 3-angled, usually simple. Leaves grass-like, (rarely 0), 3-ranked, mostly crowded at the base of the stem (the upper fewer), with tubular sheaths which are more or less closed or the lower split to the base; ligule 0 or a short prolongation of the mouth of the sheath opposite to the blade. Inflorescence of solitary, fasciculate, paniculate or spicate spikelets, composed of small distichously or spirally imbricate scales (glumes); flowers minute, 1-2-sexual, in the axils of the glumes. Perianth 0, or of 2 or more hypogynous bristles or scales (ovary enclosed in a utricle in Carex). Stamens 1-3; filaments flattened; anthers basifixed, linear. Ovary 1-celled; ovule solitary, basal, erect, anatropous; style short or long; stigmas 2-3. Fruit a compressed or trigonous nut. Seed erect, free; embryo minute, within the base of the floury albumen.—Genera 85. Species 2,600.—Cosmopolitan, chiefly marsh plants.

A. Flowering glumes usually many, distichously arranged; hypogynous bristles absent
  1. Rhachilla of spikelet deciduous .... KYLLINGA.
  2. Rhachilla of spikelet persistent, not dorsally compressed ...... JUNCELLUS.
  3. Rhachilla of spikelet persistent; style trifid .... CYPERUS.

B. Flowering glumes usually many, spirally arranged; hypogynous bristles often present
  1. Hypogynous bristles absent; style-base persistent, or if deciduous not leaving a tumour on the nut .... FIMBRYSTILIS.
  2. Hypogynous bristles 0-6, undivided, linear, rarely oblong .... SCIRPUS.

Bitter aromatic, tonic and stimulant, diuretic and diaphoretic.

KYLLINGA Rottb.

Perennial herbs tufted or with a creeping rhizome; stem trigonous, leafy below only, terminated by 1-3 sessile capitate spikes. Leaves narrow. Spikelets minute, green, strongly laterally compressed, 1-2-flowered, densely packed on short sessile oblong or globose involucrate spikes; rhachis short, naked after the fall of the spikelets, or squarrosely covered with the more or less persistent lowest glumes; rhachilla very minute, disarticulating above the two lowest glumes. Glumes 4, distichous, the two lowest hyaline, empty, much shorter than the third and fourth, the third and fourth much the largest, often green and speckled with brown, subequal or the upper longest, unequal-sided, keeled; keel sometimes winged, apiculate or cuspidate. Stamens 1-3; anthers long or short. Ovary suborbicular; style long or short, not swollen at the base; stigmas 2, linear. Fruit a strongly laterally compressed smooth nut, sometimes apiculate by the persistent style-base.—Species 50.—Tropics and subtropics.

1. Nut-bearing glume not winged in the upper half of its keel .. 1. *K. triceps.*
2. Nut-bearing glume winged in upper half of keel .... 2. *K. monocephala.*

K. odorata Vahl is used medicinally in Brazil.

1. **Kyllinga triceps** Rottb. Descr. & Ic. (1773) 14, t. 4, f. 6.

Glabrous; rhizome very short or 0; stems 5-23 cm. long, tufted. Leaves as long as (rarely longer) but usually shorter than the stem, 2-4 mm. broad, linear, acute. Spikes ovoid-oblong or subcylindric, usually 3 together (rarely solitary), the middle one the largest, 4-6 mm. diam.; rhachis clothed, after the fall of the spikelets, with the persistent lower glumes; bracts beneath the head 3-4, leaf-like, up to 7.5 cm. long. Two lower glumes hyaline, the lowest lanceolate, acuminate, 1.25 mm. long, the second lanceolate or suborbicular, the third and fourth herbaceous, membranous, green not speckled with brown, ovate-lanceolate, obtusely apiculate, strongly nerved, the uppermost (fourth) rather the longest, 2-2.5 mm. long. Stamens 2. Nut oblong or ellipsoid-oblong, yellowish brown, much compressed, 1.6 mm. long; style with 2 filiform stigmas, together nearly as long as the nut.

Distribution: N.-W. India, Sind, Bengal, Burma, Ceylon.—Africa, China, Australia.

The herb is bitter, cooling; alexiteric, vulnerary; useful in "kapha", "vata", diseases of the blood (Ayurveda).

In Malabar, a decoction of the roots is used to relieve thirst in fevers and diabetes, and oil boiled with the roots to relieve pruritus of the skin.

The roots yield an oil which is used to promote the action of the liver and relieve pruritus.

Bengal: Nirbishi, Svetagothubi—; *Hindi:* Nirbisi, Shwetgothubi—; *Malayalam:* Mottenga, Pimottenga—; *Marathi:* Mustu—; *Sanskrit:* Apavisha, Avisha, Nirvisha, Vishabhava, Vishaha, Vishahantri, Vishavairini, Vivisha—.

2. **Kyllinga monocephala** Rottb. Descr. & Ic. (1773) 13, t. 4, f. 4.—PLATE 1009B.

Glabrous or nearly so; rhizome creeping, elongate; stems 7.5-30 cm. high, usually solitary, erect. Leaves shorter than the stem, 2.5-4 mm. broad, linear, acute with a strong midnerve. Spikes solitary (rarely 2-3), the lateral when present very small, the middle spike 6-8 mm. diam.; rhachis naked or pitted after the fall of the spikelets, the lowest glumes mostly deciduous; floral bracts 3-4, very long and narrow, similar to the leaves. Spikelets 2.5 mm. long, 1-flowered. Two outer glumes hyaline, the lowest glume narrowly ovate-lanceolate, 1.6 mm. long, the second glume broadly ovate, obtuse; glumes 3 and 4 green, often sparsely speckled with brown, falcately incurved, acuminate, the upper slightly the longer, but no. 3 the broader, the keel dorsally winged about the middle, the wings spinulose, sometimes obscurely developed. Anthers small. Nut obovoid or oblong, compressed, rather more than half as long as the glume, pale reddish brown; style rather more than 0.8 mm. long; stigmas 2, filiform, as long as the style.

Distribution: Throughout India, Ceylon.—Hot and warm temperate regions of the Old World except the Mediterranean.

The plant is used as an antidote in many parts of India.

The root is a good refrigerant much used in fevers.

The herb is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Bengal: Nirbishi, Svetagothubi—; *Hindi:* Nirbishi, Swetgothubi—; *Malay:* Rumput butong—; *Malayalam:* Mottenga, Pimottenga—; *Marathi:* Mustu—; *Pampangan:* Malaapolid—; *Sanskrit:* Musta, Nirvisha—; *Tagalog:* Anuang—; *Visayan:* Barubatones, Bolobotones.

Borobotones, Bosicad, Botonsilo, Malabotones, Mutha, Sudsud, Tobotobolangit—

FIMBRISTYLIS Vahl.

Annual or perennial herbs; roots fibrous or woody; stolons 0; stems tufted. Leaves near the base of the stem, rarely reduced to sheaths, narrowly linear or filiform. Spikelets terete, angular or compressed, many-flowered, in a terminal umbellate or capitate inflorescence. Glumes imbricate spirally round the rhachilla, or the lower glumes distichous, glabrous (very rarely pubescent) deciduous, the lower 1-3 and sometimes the upper empty, the others 2-sexual; hypogynous bristles 0. Stamens 1-3; filaments flat; anthers linear, obtuse or acute, or subulately tipped. Ovary obovoid, somewhat flattened or trigonous; style long, base more or less dilated flattened or slender, glabrous, pubescent or villous, wholly deciduous; stigmas 2 in the flattened, 3 in the trigonous ovaries, usually filiform and elongate. Fruit an obovoid biconvex or trigonous (very rarely cylindric) nut. Species 225.—Chiefly tropical.

The genus is therapeutically inert.

1. **Fimbristylis junciformis** Kunth Enum. II (1837) 239.

Glabrous; rhizome woody, short or creeping; root-fibres stout, wiry; stems 10-45 cm. long, tufted, rigid, 4-5-angled or compressed above, deeply striate. Leaves crowded round the base of the stems and very much shorter than them, 2-4 mm. broad, spreading and recurved, flat, coriaceous, with a triangular acute tip and scaberulous margins; sheaths short; coriaceous. Umbel compound, with few, slender rays 2.5-7.5 cm. long, bearing distant or clustered small chestnut-brown spikelets; bracts 2-4, much shorter than the umbel, erect, rigid, acute. Spikelets 4-5 by 2.5 mm., the 2 lowest glumes distichous, the lowest empty; rhachilla stout, with caducous wings. Glumes 2.5 mm. long, ovate, shortly mucronate, with slender keel and pale hyaline margins. Stamens 3; anthers long, acuminate. Nut 1.2 mm. long, very shortly stipitate, obovoid, trigonous, obscurely ribbed and with faint vein-like markings, pale straw-coloured or nearly white, minutely umbonate; style 2 mm. long with conical base. pubescent above; stigmas 3, about as long as the style.

Distribution: All over India, Ceylon.—Madagascar, Philippines.

The roots are given in dysentery (Campbell).

Santali: Bindimuthi.

JUNCELLUS Griseb.

Stem erect, simple, leafy only near the base. Inflorescence umbellate or capitate. Spikelets linear or oblong, compressed; rhacheola persistent. Glumes distichous, deciduous, concave, muticous, 2 lowest empty, 4 to many, succeeding bisexual, uppermost 1-3 sterile or empty. Stamens 3-2, anterior; anthers oblong-linear. Nut plano-convex, broad plane face flat against rhacheola; style-base continuous with nut, not tumid; branches 2, linear.—Species 10.—Warm regions.

The genus is therapeutically inert.

1. **Juncellus inundatus** C. B. Clarke in Hook. f. Fl. Brit. Ind. VI, 595.—PLATE 1009A.

Rather stout 30-90 cm. high with the stem triquetrous at the top. Leaves often as long as the stem 6-8 mm. broad. Bracts 3-5 foliaceous, 20-45 cm. long. Umbel compound, rays 3-6, very unequal. Spikelets in open spikes 2.5-5 cm. long. Glumes broad-ovate obtuse, 5-7-nerved. Nut over half as long as the glume.

Distribution: Bengal, from Sylhet to the sea.—China.

The tubers are used as a tonic and stimulating medicine (Irvine).

Bengal: Pati—; *Hindi:* Pati—.

CYPERUS Linn.

Perennial (rarely annual) glabrous herbs; rhizome creeping, short or long or 0. Leaves mostly towards the base of the stem, occasionally reduced to sheaths. Spikelets in solitary globose or umbellate heads or spikes; involucral bracts 1 or more, foliaceous; bracteoles under the secondary divisions of the inflorescence;

rhachilla usually persistent, not or in a few species disarticulating towards the base, sometimes with membranous wings derived from the persistent glume-bases. Glumes distichous, the 2 lowest empty, those above 2-sexual, all nearly equal, deciduous from below upwards, the uppermost 1-3 sterile or empty; hypogynous scales or bristles 0. Stamens 1-3; anthers linear or oblong. Ovary compressed; style short or long or obsolete; stigmas 2 or 3. Fruit trigonous, triquetrous, obovoid, or plano-convex.—Species 400.—Tropical and warm temperate regions.

1.	Spikelets spicate or subracemose, linear, 6-20-flowered	6.	*C. iria.*
2.	Spikelets shortly spicate, 12-50-flowered	5.	*C. articulatus.*
3.	Spikelets linear, pale straw-coloured	1.	*C. scariosus.*
4.	Spikelets shortly spicate, linear-oblong, 6-16-flowered, greenish ferruginous or chestnut-red	4.	*C. longus.*
5.	Spikes loosely spicate, of 3-8 spikelets, but umbel sometimes large, sometimes reduced to 1 head and 1 spikelet	2.	*C. rotundus.*
6.	Spikelets yellow or brown, glumes over nearly their whole breadth plicate-striate	3.	*C. esculentus.*

The bitter aromatic tubers are stimulant, stomachic, diuretic emmenagogue, and anthelmintic.

The following species are used medicinally in Europe—*C. esculentus* Linn., *C. longus* Linn., *C. rotundus* Linn.—; in China, Indo China, Malaya, and the Philippine Islands—*C. rotundus* Linn—; in West Africa—*C. articulatus* Linn., *C. esculentus* Linn—; in South Africa—*C. esculentus* Linn., *C. fastigiatus* Rottb., *C. longus* Linn., *C. sexangularis* Nees—; in Madagascar—*C. aequalis* Vahl, *C. alboviridis* Clarke, *C. esculentus* Linn.—; in Guiana—*C. elegans* Linn.—.

1. **Cyperus scariosus** Br. Prodr. 216.—PLATE 1010.

Glabrous, stolons slender, 0.8-5 cm. by 1.6 mm., clothed by elliptic acute lax striate, concolorous scales 3 mm. long; stems long, slender, 40-90 cm. long, triquetrous, at top 1-1.6 mm. diam. Leaves variable, usually short, less than one-third of the stem, sometimes much longer, sometimes absent, narrow, weak. Umbel thin slender contracted, rays slender sometimes up to 7.5 cm. long sometimes not 6 mm. Spikelets linear, pale straw-coloured, bracts nearly always as the leaves, *i.e.*, hardly any when leaves short, exceeding inflorescence when leaves longish.

Distribution: Bengal, Pegu.—Australia.

The root is pungent, acrid, cooling; galactagogue; useful in "kapha", biliousness, fever, dysentery, bad taste, thirst, burning sensation, fatigue (Ayurveda).

The root has a bitter hot bad taste; carminative, emmenagogue; enriches the blood; increases appetite; useful in urinary discharges, menorrhagia, stuttering, defective mind, oedema, piles, ozoena, eyesore, brain and chest troubles, scorpion-sting, lumbago (Yunani).

The root is considered cordial, stomachic, and desiccant, and is used for washing the hair. Also regarded as diaphoretic and diuretic. The root is given in conjunction with valerian in cases of epilepsy. The root is astringent, useful in diarrhœa. A decoction is used in gonorrhœa, and also in syphilitic affections.

The root is not an antidote to scorpion-venom (Caius and Mhaskar).

Arabic: Soad, Soadekufi—; *Bengal:* Nagarmutha—; *Burma:* Vomonniu—; *Canarese:* Konnarigadda, Nagarmusthe—; *Deccan:* Nagarmotah—; *Gujerati:* Nagaramothya—; *Hindi:* Nagarmotha—; *Malayalam:* Korakizhanna—; *Marathi:* Lawala—; *Persian:* Mushkezamin—; *Sanskrit:* Chakranksha, Charukesara, Chudalapindamusta, Kachharuha, Kalapini, Nadeyi, Nagarmusta, Nagarotha, Shishira, Vrishadhmankshi, Uchchta—; *Tamil:* Koraikkilangu—; *Telugu:* Kolatungamuste, Tungagaddalaveru—; *Urdu:* Nagarmotha—.

2. **Cyperus rotundus** Linn. Sp. Pl. (1753) 45.—PLATE 1011.

Glabrous; stolons elongate, slender, 10-20 cm. long, bearing hard ovoid tunicate black fragrant tubers 0.8-2.5 cm. diam.; root-fibres clothed with flexuous hairs; stems subsolitary, 10-75 cm. long, triquetrous at the top, sometimes tuberous at the base. Leaves shorter or longer than the stem, narrowly linear, 4-8 mm. broad, finely acuminate, flat, 1-nerved. Umbel simple or compound; rays 2-8, the longest reaching 7.5 cm. long, bearing short spikes of 3-10 slender spreading red-brown spikelets (the inflorescence sometimes contracted into a head, occasionally of only one spikelet); bracts 3, variable in length, the longest reaching 15 cm. long, but sometimes abbreviated and much shorter than the head. Spikelets variable in length, 1.6-3.8 cm. by 2.5 mm., linear, subacute, red-brown, 10-50-flowered, compressed; rhachilla with hyaline wings. Glumes 3-4 mm long, oblong, obtuse or slightly apiculate; back reddish brown, 3-7-nerved; sides, margins, and tip hyaline. Stamens 3; anthers 2.5 mm. long. Nut 1.6 mm. long, broadly obovoid, trigonous, greyish black; style 1.6 mm. long; stigmas 3, elongate, reaching 4 mm. long, much exserted.

Distribution: Throughout India, Ceylon.—Most hot countries.

The root is pungent, acrid, cooling; astringent, bitter, appetiser, stomachic, anthelmintic; useful in leprosy, thirst, fever, blood diseases, biliousness, dysentery, pruritus, pain, vomiting, epilepsy, ophthalmia, erysipelas (Ayurveda).

The root is diuretic, emmenagogue, diaphoretic, anthelmintic, vulnerary; useful for ulcers and sores, fevers, dyspepsia, urinary concretions (Yunani).

The roots are commonly used as a diaphoretic and astringent. They are also credited with stimulant and diuretic properties. They are held in great esteem as a cure for disorders of the stomach and irritation of the bowels.

The bulbous roots are scraped and pounded with green ginger, and in this form, mixed with honey, they are given in cases of dysentery in doses of about a scruple. They are used too as an anthelmintic.

In the Konkan, the fresh tubers are applied to the breast as a galactagogue.

In Chota Nagpur, the roots are used in fever (Campbell).

In Ceylon, a decoction of the tubers is given in fever, diarrhœa, dyspepsia, and stomach complaints.

The root is considered diuretic and antiperiodic in Cambodia.

According to the Chinese the small tubers act on the lungs and liver. Their general action is tonic, stimulating, and stomachic.

The tuber is useless in the antidotal treatment of either snake-bite (Mhaskar and Caius) or scorpion-sting (Caius and Mhaskar).

The essential oil from the tubers has been studied chemically by Sanjiva Rao, Panicker, and Sudborough (*Journ. Ind. Inst. Sc.*; VIII (A), 1925).

Annam: Huong phu—; *Arabic:* Suad—; *Australia:* Yelka—; *Bengal:* Motha, Mutha—; *Bicol:* Botobotones—; *Bombay:* Barikmoth, Musta—; *Cambodia:* Kravalchruk, Kravanhchruk—; *Canarese:* Tungegadde—; *Chinese:* Hiang Fou Tse, Houi T'eou Ts'in, Hsiang Fu, Hsiang Fu Tzu, So Ts'ao—; *Ceylon:* Nut Grass—; *Deccan:* Korekijhar—; *Gujerati:* Motha—; *Hausa:* Ayaaya—; *Hindi:* Motha, Mutha—; *La Reunion:* Oumine—; *Malay:* Rumput haliya hitam—; *Malaya:* Heong foo—; *Marathi:* Bimbal, Motha—; *Mundari:* Bathabijir—; *Nasirabad:* Kabb—; *New Caledonia:* Jilio—; *Pampangan:* Cusung, Galonalpas, Malaapolid, Mota, Omading, Omadiung, Onoran, Sursur—; *Sanskrit:* Abda, Arnoda, Bhadrakshi, Bhadramusta, Gangeya, Granthi, Gundra, Hima, Kachhola, Kakshottha, Kasheru, Krodeshtha, Kuru, Kurubilva, Kutannata, Musta, Mustaka, Sugandhigranthila, Valya, Varahi, Varida, Vindakhya—; *Santali:* Tandisura—; *Sinhalese:* Kalanduru—; *Sokoto:* Girigiri—; *Spanish:* Juncia redunda—; *Tagalog:* Mutha—; *Tamil:* Kora, Korai—; *Telugu:* Bhadramuste, Gandala, Kaivartakamuste, Mustakamu, Shakhatungaveru, Tungamuste—; *United States of America:* Nut Grass—; *Uraon:* Utrubanda—.

3. **Cyperus esculentus** Linn. Sp Pl. (1753) 45.—PLATE 1012.

An erect glabrous herb up to 50 cm. in height with slender subterranean stolons more or less covered with acute rather hard strongly-veined scales and ending in ovoid to cylindrical edible tubers up to 2 cm. in length. Stem-base pale brown, leaf-sheaths not fibrous, stems triquetrous, smooth, finely striated. Leaf-blades shorter than the stems, linear and gradually tapering in the upper part to a fine acuminate apex, 3-5 mm. in width. Inflorescence primarily umbellate, of sessile and peduncled spikes the rays up to 7.5 cm. in length, primary bracts about 4, unequal, leaf-like, the longest up to

10 cm. or more. Spikes rarely exceeding 2.5 cm. and most often simple, the first glumes (or secondary bracts) of the lowest spikelets sometimes with a short narrow leafy blade. Spikelets linear, about 13 mm. long or shorter, 1.6 mm. wide; rhachis slender with narrow hyaline wings. The two lowest glumes of each spikelet linear lanceolate, acuminate. Flowering glumes boat-shaped, with a rounded or slightly emarginate apex, 3 mm. long, 1.6 mm. in breadth when spread out, 3 lateral nerves on each side of the keel nerve. Stamens 3. Style divided to below the middle. Nut obovoid-ellipsoid in outline with 3 sharp angles, 1.6 mm. long.

Distribution: From the Punjab to the Nilgiri Mts., scattered.—S. Europe, Africa, America.

The tuber is cooling, sweet, acrid; galactagogue, astringent to the bowels, aphrodisiac; improves taste; useful in eye diseases, burning sensations, leprosy; causes "vata" and "kapha" (Ayurveda).

In Guinea, the tubers are given as a cooling drink; the leaves are applied topically for headache. The juice expressed from the tubers is used as an aphrodisiac in Sierra Leone and on the Gold Coast.

In Madagascar, the tuber is used as a stimulant and aphrodisiac.

The Zulus chew portions of the root for the relief of indigestion, especially when this condition is accompanied by foul breath. Zulu girls, with a view to hastening the inception of menstruation, eat porridge in which a handful of the boiled roots has been mashed.

Ada: Fie—; *Afrikaans:* Euntjie, Hoenderuintjie, Uintjie—; *Catalan:* Chufa—; *English:* Chufa, Ground-almond, Tiger-nuts—; *Ewe:* Fie, Fio—; *Fanti:* Atadwe—; *French:* Souchet comestible, Souchet sultan, Souchet tubéreux, Trasi—; *Ga:* Atangwe—; *Hausa:* Aya—; *Hindi:* Chichada—; *Hova:* Karepoka—; *Krepi:* Fio—; *Krobo:* Fai—; *Madagascar:* Karekika—; *Malinke:* Toki—; *Malta:* Babbagiggi, Chufa, Dolcichini, Edible Rushnut, Habbghaziz—; *Punjab:* Dila, Kaseru—; *Sanskrit:* Kaseruka, Kshudramusta, Sugandhi, Sukanda, Sukareshta—; *Spanish:* Chufa, Juncia avellanada—; *Twi:* Atadwe—; *West Africa:* Rush Nut, Tiger Nut—; *Zulu:* inDawo—.

4. **Cyperus longus** Linn. Sp. Pl. 67.

Glabrous; rhizome somewhat thick, creeping, 3 or 2 mm. in diam., clothed by loose ovate triangular striated brown scales. Stem rather robust at the top subacutely trigonous, at the base oblique or decumbent, not nodosely thickened nor suddenly contracted into a wiry rhizome, 20-90 cm. high. Leaves ½-¾ the length of the stem, 0 6 cm. broad. Umbel-rays 3-10, 2-20 cm. long; spikelets shortly spicate linear-oblong, 6-16-flowered, 1 cm. long, 3 mm. broad, slightly compressed, greenish ferruginous or chestnut-red. Glumes ovate, obtuse, hardly keeled, 5-7-nerved, back green, margins narrowly scarious. Stamens 3; anthers linear-oblong, muticous or scarcely apiculate. Wings of the rhachilla elliptic, hyaline, persistent; nut ellipsoid, ½-1/3 the length of the glume, trigonous, black, the style shorter than the nut, branches linear shortly exserted.

Distribution: Quetta, Mt. Abu, westwards to the Atlantic.

The bitter aromatic tuber is used in Spain as a stimulant, stomachic, and emmenagogue.

The Zulus prepare an enema from the tuber for children with stomach troubles. They also blow the powdered tuber into the nose and ears for colds and other troubles in these regions, and the tuber may be chewed for the same purposes.

At Filabusi, in Southern Rhodesia, the juice of the plant is regarded as being very poisonous, and is said to burn the skin when applied to it.

Catalan: Castanyola—; *English:* Cypress, Cypress-root, Galanga, Galingale, Sweet Galingale—; *Filabusi:* Mlabie—; *French:* Souchet long, Souchet odorant—; *Spanish:* Juncia olorosa—.

5. **Cyperus articulatus** Linn. Sp. Pl. (1753) 66.

Glabrous; stolons 3-4 mm. diam., clothed by ovate-lanceolate striate brown-black scales, 1.5 cm. long. Stem robust, terete, 90 cm. to 1.8 m. high, often 2-6 cm. apart on the thick woody rhizome, at the top 3-6 mm. diam., terete or scarcely trigonous, when dry usually with false nodes 1.5 cm. apart; upper sheaths usually terminated by a subspathaceous lanceolate limb, rarely by a small green leaf. Umbel-rays often 10, up to 4-8 cm., bracts 1.25 to 1.5 cm. long, ovate, striate, subturgid at the base hardly keeled, concave, margins not reflexed. Spikes linear, many-flowered; spikelets 5-15 together, shortly spicate, 6-8 cm. long, 1-2 cm. broad, 12-50-flowered; straw-coloured, afterwards dusky. Glumes even in fruit imbricate, ovate, obtuse, concave, scarcely keeled, obscurely 3-5-nerved on the back; wings of the rhachilla oblong or elliptic, scarious, ultimately deciduous. Stamens 3; anthers linear-oblong; muticous. Nut obovoid or oblong-ellipsoid, $^{3}/_{5}$ the length of the glume, trigonous, acute at either end, black; style shorter than the nut; branches linear, shortly exserted.

Distribution: Bengal to Ceylon.—All warm regions.

The tuber is tonic and stimulant.

Betsimisaraka: Mita—; *Guinea:* Gorhe, Madia—; *La Reunion:* Jambelon—.

6. **Cyperus iria** Linn. Sp. Pl. (1753) 67.

A glabrous annual; root fibrous; stems tufted, 35-50 cm. long, triquetrous, striate. Leaves as long as the stem or shorter, 3-5 mm. broad, multistriate, finely acuminate, flaccid. Umbel decompound, of many primary rays 2.5-12.5 cm. long, bearing irregularly fascicled umbellules formed of narrow interrupted spikes of 5-20 small few-flowered spikelets; bracts 3-5, the longest sometimes reaching 20 cm. long. Spikelets 6-8 by 2.5-3 mm., linear-oblong, obtuse, compressed, 6-20-flowered, yellow or pale brown; rhachilla not winged. Glumes 2.5 by 1.6 mm., elliptic-obovate, obtuse, muticous or very minutely apiculate, loosely or scarcely imbricate, 3-5-nerved, with broad hyaline margins. Stamens 2 or 3; anthers small, oblong, muticous, yellow. Nut 2 mm. long, obovoid, triquetrous, brown or black; style very short, scarcely 0.5 mm. long; stigmas 3, very short, slightly exserted from the glume.

Distribution: Throughout India in rice fields, Ceylon.—Indo-China, Australia, Mediterranean.

The plant is tonic, stimulant, stomachic, and astringent.

Bengal: Burachucha—; *Hasada:* Jimtu—; *Malay:* Rumput tuloh belalang—; *Mundari:* Huring beeongjimtu—; *Naguri:* Jindu—; *Sinhalese:* Welhiri—.

SCIRPUS Linn.

Glabrous often tall herbs, leafless or leafy at the base only (very rarely leafy all along the stem); stems terete, trigonous or triquetrous. Inflorescence terminal or lateral, of clusters or umbels of oblong or ovoid many-flowered sessile or pedicellate spikelets. Glumes spirally imbricating round a stout or slender rhachilla, the lowest 2 and a few of the uppermost empty; hypogynous bristles 0 or 2-7, retrorsely scabrid or rarely plumose. Stamens 1-3; anthers linear. Ovary obovoid; style slender, the base dilated; stigmas 2-3, slender. Nut obovoid, trigonous or biconvex, smooth or nearly so; the style leaving no button on the nut.—Species 200.—Cosmopolitan.

A. Nut marked with transverse wavy lines; hypogynous bristles absent
  Stems flowering nearer to the base than to the top ...... 2. *S. articulatus.*
B. Nut not marked with transverse wavy lines; hypogynous bristles present
  I. Hypogynous bristles retrorsely scabrid (not plumose)
    a. Glumes 2-fid at the apex .... 4. *S. maritimus.*
    b. Glumes not 2-fid at the apex .... 1. *S. grossus.*
  II. Hypogynous bristles plumose
    Inflorescence terminal; nut obovoid .... 3. *S. kysoor.*

The root is astringent and diuretic.

S. maritimus Linn. is used medicinally in China, *S. cernuus* Vahl. and *S. paludicola* Kunth. in South Africa.

1. **Scirpus grossus** Linn. f. Suppl. (1781) 140.—PLATE 1013.

Rootstock stout, stoloniferous or not; root-fibres thick; stem 1.8-3 m. high, as thick as the little finger, triquetrous, spongy, with concave sides and smooth angles. Leaves few radical, 60-90 cm. by 13 mm., much keeled, finely acuminate, coriaceous with smooth or scaberulous margins; sheaths long, open. Spikelets subglobosely ovoid, 4-10 mm. long, dark brown, in large corymbiform decompound terminal open or contracted umbels 7.5-20 cm. diam., solitary on the top of rigid erect or spreading rays of various lengths; involucral bracts 3, leaf-like, the longest up to 90 cm. long by 13-20 mm. broad at the base, flat, linear, acuminate; bracts of the secondary and tertiary umbels lanceolate, acute, scarious, 6-13 mm. long. Glumes rather loosely imbricate, 3-4 mm. long, elliptic, obtuse, mucronate, keeled, membranous; hypogynous bristles 6, unequal, longer than the nut, retrorsely scabrid (not plumose), brown. Stamens 3, reaching 4 mm. long; anthers linear, large. Nut 2 mm. long, obovoid, trigonous, with a minute conical tip (style-base), ashy-grey or yellowish, smooth; style 1.6 mm. long, with dilated base; stigmas 3, as long as the style.

Distribution: More or less throughout India, Ceylon.—Malaya, Tonkin, Philippines.

The medicinal properties are the same as those of *Cyperus esculentus* (Ayurveda).

The root is slightly sweet, cooling; laxative, tonic to the liver alexiteric, diuretic; useful in biliousness, burning sensations, vomiting, diarrhœa, fevers, gonorrhœa (Yunani).

The root has astringent properties, and is given in diarrhœa and vomiting.

Bengal: Kasuru, Keṣur—; *Bombay:* Kachera—; *Hindi:* Kasuru, Kesur—; *Marathi:* Kasara—; *Mundari:* Jomekesari, Marangkesari—; *Punjab:* Dila, Kaseru—; *Sanskrit:* Gundakanda, Kaseru, Kaseruka—; *Telugu:* Gundatungagaddi—; *Urdu:* Kaseru—.

2. **Scirpus articulatus** Linn. Sp. Pl. (1753) 47.

A glabrous perennial (?) herb; stems 30-90 cm. long, densely tufted, as thick as the little finger, spongy and transversely septate within (visible externally), terete, striate, flowering nearer the base than the top. Leaves 0, or the sheaths with a membranous acute tip sometimes 2.5 cm. long. Spikelets variable in length, 6-20 cm. long, ovoid-oblong, acute, terete or obscurely angular, rusty-brown, sessile in laterally stellately spreading clusters of 15-60; bracts 0. Glumes 5 mm. long and nearly as broad, broadly ovate, acute, very shortly mucronate, closely imbricate, membranous, concave, persistent, scarcely keeled, with a subcordate base and hyaline margins.

Stamens 3, reaching 5 mm. long; anthers linear, obtuse, 0.8 mm. long, yellow. Nut 2 mm. long, obovoid, sharply triquetrous, black opaque, shortly pointed, striate with transverse wavy lines; style 2 mm. long; stigmas 3, nearly as long as the style.

Distribution: All over India, Ceylon.—Africa, Philippines, Australia.

The plant is used as a purgative.
Hindi: Chichora—.

3. **Scirpus kysoor** Roxb. Hort. Beng. (1814) 6

Rootstock stoloniferous, the stolons often producing hard globose tubers 13-20 mm. diam., densely clothed with matted fibres; stems straight, erect 1.2-1.8 m. high, triquetrous, with sharp often retrorsely hispid angles. Leaves several to each stem and about as long as the stem, 13-20 mm. wide, linear, acuminate, the margins and keel somewhat hispid when young. Umbel terminal, supra-decompound, very similar to that of Scirpus grossus; bracts 3, very unequal, the longest often 60 cm. or more long, the shortest 5-7.5 cm., leaf-like. Spikelets 4-6 mm. long, subglobosely ovoid, brown. Glumes 3 mm. long, broadly ovate or suborbicular, membranous, reddish brown, with a strong keel in the upper part produced into a straight or slightly recurved mucro about 0.6 mm. long. Stamens 3, reaching 3 mm. long; hypogynous bristles 5, plumose with many minute multicellular hairs. Nut 2 mm. long, obovoid, trigonous, with pyramidal apex, smooth, yellow; style 1.6 mm. long with dilated red base; stigmas 3, as long as or longer than the style.

Distribution: More or less throughout India. Sometimes cultivated.

The tubers are given in diarrhœa and vomiting.

Bengal: Kasuru, Kesur—; *Bombay:* Kachera—; *Hindi:* Kasuru, Kesur—; *Punjab:* Dila, Kaseru—; *Sanskrit:* Kaseruka—; *Telugu:* Gundatungagaddi—.

4. **Scirpus maritimus** Linn. Sp. Pl. (1753) 51.

Glabrous; rhizome creeping, bearing tubers; stems 30-90 cm. long, stout triquetrous. Leaves grass-like, harsh, numerous, often as long as the stem, 6-8 mm. broad, keeled; sheaths long. Inflorescence terminal or subterminal, umbellate with rays of unequal length; bracts 3-5, leaf-like, the longest much exceeding the inflorescence, keeled, finely pointed. Spikelets 3-8 or solitary on each ray (or umbel rarely reduced to a head of 3-1 spikelets), 1-2.5 cm. long and often 5 mm. diam., ovate-oblong or cylindric, reddish brown. Glumes 6 mm. long, broadly ovate, strongly keeled, membranous, glabrous or puberulous, brown or golden brown, bifid at the apex and with a long subrecurved mucro about 1.25 mm. long formed by the production of the keel between the apical lobes; hypogynous bristles 3-6, unequal, 1.6-2.5 mm. long, shorter than the nut, slender, retrorsely scabrid. Stamens 3, reaching 6 mm. long. Nut 3 mm. long, obovoid, obtusely trigonous, umbonate, quite smooth, pale yellow, nearly white; style 2.5-3 mm. long; stigmas 3, as long as the style.

Distribution: Kashmir, Kashgar, Moradabad, W. Peninsula.—Old World.

GRAMINEAE.

Erect decumbent or creeping herbs (rarely suffruticose), or in Tribe BAMBUSEAE shrubs or trees; stems usually branched at the base, terete or compressed, with hollow or solid internodes. Leaves distichous, simple, usually long and narrow, generally parallel-nerved, with a sheathing base (sheath) distinct from the blade and rarely an interposed petiole; sheath split to the base (very rarely entire), with usually a transverse erect appendage (ligule) consisting of a membrane or a fringe of hairs at the union with the blade. Inflorescence terminal (rarely terminal and lateral), composed of variously arranged spikelets, paniculate, racemose, capitate, simply or compoundly spicate (rarely of a single spikelet). Spikelets consisting of an axis (rhachilla) and typically of 3 or more alternate distichous more or less heteromorphous bracts (glumes), of which the two lowest (involucral glumes) form an involucre to the spikelet and are empty, while the following (floral glumes) bear in their axils subsessile flowers subtended by a hyaline 2-keeled or 2-nerved dorsal scale (palea); floral glumes differing usually in structure and size from the involucral glumes, and forming with the palea and the flower proper false flowers (florets), which are alike or different in structure and sex. Flowers hermaphrodite or 1-sexual (often with the rudiments of the other sex), consisting of 2 (rarely 3) minute hyaline fleshy scales (lodicules) which represent a perianth (sometimes absent), and of stamens or a pistil or both. Stamens usually 3 (rarely 6, 4, 2, or 1, very rarely more), hypogynous; filaments slender, usually free; anthers versatile, fugacious, with 2 parallel cells, usually dehiscing by a longitudinal slit. Ovary entire, 1-celled; ovule erect, anatropous; styles 2 (rarely 3 or 1), free or connate at the base, usually elongate and exserted from the apex or sides of the spikelet, clothed with simple or branched stigmatic hairs. Fruit a seed-like grain, free within the flowering glume and palea or adnate to either or both; pericarp very thin (rarely thick and separable from the seed). Seed erect; albumen copious, floury; embryo minute, at the base of and outside the albumen; cotyledon shield-shaped with an erect conical plumule and a descending conical radicle.—Genera about 450. Species 4,500.

I. Spikelets spicate, all unisexual, male spikes in terminal panicles or continuous with the female spikes
  a. Fruiting spikelets enclosed in a stony nut-like polished bract .... Coix.
  b. Fruiting spikelets having all the inner glumes concealed within the greatly enlarged hardened outer .... Polytoca.
  c. Fruiting spikelets densely crowded on a cylindric spongy rhachis .... Zea.

II. Spikelets homo- or hetero- gamous, 1-2-flowered, solitary or 2-, rarely 3- nate, on the internodes of an articulate spike or raceme
  Spikelets 2-nate. Lower involucral glume globose ...... Manisuris.

III. Spikelets homogamous, in compound racemes or panicles. Lower involucral glume not sunk in a hollow of the rhachis
  Spikelets in a thyrsus of spiciform racemes, 1-flowered, awnless .... Saccharum.

IV. Spikelets heterogamous, 1-flowered, 2- rarely 3- nate on the whorled articulate branches of simple or compound racemes or panicles ....
  a. Spikelets in threes, one of them fertile or in racemes of 2-8 pairs .... Sorghum.

b. Racemes of many pairs of spikelets; primary branches of panicles in whorls of 6-20	VETIVERIA.
c. Sessile spikelets of all pairs hermaphrodite, awned	AMPHILOPHIS.
d. Racemes binate with a space supporting or surrounding each pair, the lowest pair of one of the racemes homogamous male or neuter, all pairs of the other heterogamous	CYMBOPOGON.
e. Racemes many-noded, solitary; all pairs of spikelets hetergamous and alike, or the lowest 1-many homogamous and barren	HETEROPOGON.
V. Spikelets 2-flowered; upper flowers bisexual, lower male or neuter, rarely both fertile	
a. Spikelets dorsally flattened, base not thickened; glumes 3 with very rarely a minute 4th	PASPALUM.
b. Glumes awned from the entire acute or acuminate tip or caudate or cuspidate-acuminate. Racemes dense, more or less secund	ECHINOCHLOA.
c. Spikelets panicled or spicate; lower floral glume not beaked, upper floral glume crustaceous	PANICUM.
d. Spikelets each surrounded by an involucel of bristles	SETARIA.
e. Spikelets in involucelled deciduous fascicles. Involucel of bristles	PENNISETUM.
f. Spikelets innumerable, very minute, hairy, densely crowded in the capillary branches of a very large panicle	THYSANOLAENA.
VI. Spikelets 2- or more- flowered; rhachilla produced	
Spikelets 2-6-flowered; flowering glumes awned; awn subterminal or dorsal	AVENA.
VII. Spikelets panicled, 2-many-flowered; glumes very narrow, flowering glumes penicillate	
Rhachilla very short; flowering glumes glabrous; callus with long silky hairs	PHRAGMITES.
VIII. Inflorescence various; spikelets 2-many-flowered; flowering glumes 1-3-nerved, entire, 3-toothed, 3-lobed or 3-awned	
Floral glumes entire; acute or acuminate	DESMOSTACHYA.
IX. Spikelets 1- or more- flowered, biseriate and secund on an inarticulate spike or on the spiciform branches of a slender panicle; flowers all or the lower only bisexual	
a. Spikes digitate, 1-flowered, upper imperfect flower absent	CYNODON.
b. Spikes digitate or whorled; spikelets 3-6-flowered, densely crowded, awnless	ELEUSINE.
c. Spikes terminating with a sharp point; upper involucral glume and floral glumes rigidly mucronate or shortly awned	DACTYLOCTENIUM.
X. Spikelets 1-flowered, articulate on their pedicels and deciduous from them; pale 1-3-nerved, stamens 6 or fewer	
a. Spikelets bisexual, awned; glumes 2, narrow, thin	HYGRORYZA.
b. Spikelets bisexual, awned or not; glumes 4: I and II minute or setaceous	ORYZA.
XI. Spikelets sessile, singly or in clusters; florets 1 or more	
a. Flowering glumes 5-9-nerved, lateral nerves not conniving, short or ending in teeth or awns	TRITICUM.

b. Spikelets in groups of 3 at the nodes of a dense spike; floral glumes, 5-nerved .... HORDEUM.
c. Flowering glumes 5-7-nerved, lateral nerves conniving or confluent with the single terminal awn .... AGROPYRON.

XII. Shrubs or trees
a. Pericarp thin, adnate to the seed; pales all 2-keeled, stamens 6, filaments free .... BAMBUSA.
b. Pericarp fleshy or crustaceous; spikelets 2-many-flowered; pale 2-keeled, lodicules none, stamens 6 .... DENDROCALAMUS.

Nutrient and emollient; more rarely diuretic and diaphoretic. Alkaloids—hordenine, oridine, temuline—, and glucosides—clavicepsin, dhurrin—have been obtained.

OFFICIAL:—*Agropyrum repens* Linn. in France and Turkey,—Palisot de Beauvais (Switzerland).

Avena agraria Brot. var. *mutica* and *sesquialtera* Brot. (*A. strigosa* Schreber var. *elatior* Kunth.) in Portugal.

Cymbopogon Winterianus Jowitt (Germany).

Hordeum distichon Linn. (Great Britain)—var. *seminibus nudis* Kunth. (*H. nudum* Arduin) and *H. hexastichon* Linn. in Portugal; *H. vulgare* Linn. in France, Spain, and the United States of America.

Oriza sativa Linn. in France; *Oryza sativa* Linn. in Austria, Belgium, Germany, Great Britain, Holland, Italy, Portugal, Spain, Switzerland, Turkey.

Panicum Dactylon Linn. (*Paspalum Dactylon* Lamk.) in Portugal.

Saccharum officinarum Linn. in Portugal, Spain, Switzerland, United States.

Triticum spp. in Portugal; *T. repens* Linn. in Austria, Belgium, Hungary; *T. repens* Linn. (*Agropyrum repens* Beauvais) in Portugal; *T. sativum* Lamk. in Belgium, Germany, Great Britain, Hungary, Italy, Russia, Sweden, Switzerland, Turkey; *T. sativum* Linn. in France; *T. vulgare* Vill. in Austria, Denmark, France, Holland, Norway; *T. vulgare* Willars in Spain.

Zea Mais Linn. in Belgium, France, Turkey; *Z. Mays* Linn. in Great Britain, Spain, and the United States; *Z. Mays* Linn. (*Z. vulgaris* Mill.) in Portugal.

ORYZA Linn.

Tall annual or perennial grasses. Leaves long, narrow, flat. Spikelets 1-flowered, loosely arranged on the branches of an elongate panicle, disarticulating above the 2 lowest glumes. Glumes 5; the 2 lower involucral glumes below the articulation of the spikelet minute, scale-like (rarely absent); the 2 next involucral glumes above the articulation of the spikelet subulate; floral glume solitary, dimidiate-oblong, coriaceous or chartaceous, 5-9-nerved, awnless or with a short or long straight terminal awn; palea linear or lanceolate, as long as the glume, 3-5-nerved, coriaceous, with membranous margins. Lodicules 2, entire or 2-lobed. Stamens 6; anthers linear. Style short, free; stigmas laterally exserted from the glume. Grain narrowly oblong, compressed, closely covered by or adnate to the glume and the palea.—Species about 17.—Tropics.

Root emollient and astringent.

O. sativa Linn. is used medicinally in China, Malaya, and Brazil.

The grain of *Oryza sativa* Linn. is officinal in Austria, Belgium, Germany, Great Britain, Holland, Italy, Portugal, Spain, Switzerland, Turkey; *Oriza sativa* Linn. in France.

1. **Oryza sativa** Linn. Sp. Pl. (1753) 333.

Annual. Stems creeping or floating, 60 cm. to 3 m. high. Leaves 30-60 cm. by 6-8 mm. or more, striate, scaberulous, 1-nerved; sheaths smooth; ligule long 2-partite. Spikelets loosely panicled, not imbricating, awn 7-13 cm. long, yellow or reddish, shining. Involucral glumes $\frac{1}{4}$-1/3 the length of the floral glume, lanceolate; floral glume hispid above, dorsally spinescently ciliate, awn very long.

Distribution: Widely cultivated.

The grain is acrid, sweet; oleaginous, tonic, aphrodisiac, fattening, diuretic; improves taste; useful in biliousness; increases "vata" and "kapha" (Ayurveda).

In India, rice is used variously in sick diet. Boiled rice, when hot, is used as a poultice.

Certain varieties of specially prepared grains are used medicinally in China and Malaya. Malted rice is used as a peptic, carminative and tonic.

In Europe, the grain has long been considered to exercise pectoral virtues, and useful for persons troubled with lung disease and spitting of blood, as in pulmonary consumption. Boiled rice is very useful in disorganised digestion, in bowel derangements, and in diarrhœa. Rice-water, made in a similar manner to barley-water, is used as a soothing, nourishing drink in febrile diseases and inflammatory states of the intestines.

In Cambodia, the husk of the grain is considered anti-dysenteric. The roasted grain mixed with an equal amount of palm sugar is prescribed in "Strychnos" poisoning. Boiled in water and then dried in the sun the grain enters into the composition of remedies for leprous ulcers.

Annam: Lua nep, Lua nui, Lua song lon, Lua te, Lua toc—; *Arabic:* Arruz, Arz—; *Armenian:* Priusch—; *Belgium:* Bhatta—; *Bengal:* Chal, Chanvol, Dhan—; *Bombay:* Bhatta, Dangar—; *Broach:* Dangar—; *Burma:* Chan, Saba, San—; *Cambodia:* Srau damnop, Srau Khsai, Srau prapeai vea—; *Canarese:* Akki—; *Catalan:* Arros—; *Central Provinces:* Deodhan—; *Chinese:* Ch'en Lien Mi, Hsien, Keng, Tao—; *Cochin China:* Lua—; *Danish:* Riis—; *Deccan:* Chanval—; *Dutch:* Rijst—; *Egypt:* Arus, Rus, Ruz—; *English:* Rice—; *Ewe:* Molung, Morli, Morlu—; *Fanti:* Omo—; *Fatehpur:* Phasai—; *French:* Riz—; *Ga:* Omong—; *Gambia:* Mannow—; *German:* Reiss—; *Greek:* Oryza, Oryzion, Oryzon—; *Gujerati:* Chokha—; *Hausa:* Shinkafa—; *Hazara:* Shali—; *Hindi:* Chaval, Dhan—; *Hungarian:* Riskasa—; *Italian:* Riso—; *Japanese:* Ko, Kome, Mostj—; *Jhang:* Munji—; *Kashmir:* Dein, Tani—; *Konkani:* Bhat—; *Krepi:* Morli—; *Krobo:* Omong—; *Laos:* Khao chao, Khao hai, Khao loi, Khao nieu—; *Madagascar:* Vary—; *Malay:* Pady—; *Malayalam:* Ari—; *Marathi:* Bhat, Tandula—; *Mount Abu:* Garri, Sal—; *Mundari:* Baba—; *Mysore:* Bhatta, Nellu—; *North-West Provinces:* Chanwal, Dhan, Jarhan, Lehi, Munji, Pusai—; *Oudh:* Dhan, Pasahi, Passari, Tinni—; *Pandran:* Kandahari, Khisumbhuz, Wilaiti—; *Partabgarh:* Sathi—; *Persian:* Biranj—; *Peshawar:* Shol—; *Philippines:* Bolahan—; *Polish:* Ryz—; *Portuguese:* Arroz—;

Punjab: Dham, Munji, Shalian, Tai—; *Rajputana:* Garri—; *Rampur:* Phasai—; *Roumanian:* Orez—; *Russian:* Psheno, Ris, Sarachinskoe psheno—; *Sanskrit:* Dhanya, Nivara, Shali, Tandula, Vrihi—; *Santal:* Uri, Urihoro—; *Shahrig:* Shali—; *Sind:* Chanwar, Sari, Sugdasi—; *Sinhalese:* Goyan, Hal, Uruwi—; *Spanish:* Arroz—; *Swedish:* Ris—; *Tagalog:* Bigas, Binambang, Bolohan, Dumali, Lamuyo, Malagguit, Palay, Quinanda, Tangi—; *Tamil:* Arishi, Arisi, Nellu—; *Tartary:* Dugu—; *Tayabas:* Nilomot—; *Telugu:* Biyam, Dhanyamu, Errajilama, Nevaridhanyamu, Urlu, Vadlu, Vudlu—; *Tobu:* Shali—; *Turkish:* Pirins—; *Twi:* Aimong, Mong—; *Uriya:* Chaul, Dhan, Rabana—; *Zehri:* Pirkalanari—

HYGRORYZA Nees.

A floating glabrous grass; stems stoutish, diffusely branched, rooting in dense masses at the nodes; branches short, erect, leafy. Leaves oblong, obtuse. Spikelets few, erect, 1-flowered, articulated on the pedicels, but tardily deciduous, long-awned, lanceolate on the few widely-spreading branches of a shortly pedunculate panicle. Involucral glumes 0; floral glume solitary, thinly chartaceous, narrowed to an erect scaberulous awn, strongly 5-nerved, the nerves scabrid and ciliate, the lateral nerves marginal; palea much narrowed, 3-nerved, acuminate, with ciliate keel. Lodicules minute, suborbicular. Stamens 6; anthers long, very slender. Styles 2, free; stigmas plumose, laterally exserted. Grain oblong, narrowed at the base, obtuse, free within the glume and palea.—Species 1.—India, Ceylon, Tonkin.

1. **Hygroryza aristata** Nees in Edinb. N. Phil. Journ. XV (1833) 380.

A glabrous floating grass; stem 30 cm. (and more) long, spongy, with feathery whorled roots at the nodes; internodes long or short. Leaves 2.5-7.5 cm. by 13-20 mm., linear or ovate-oblong, obtuse, more or less scaberulous above, smooth and glaucous beneath, subcoriaceous, with smooth or slightly scaberulous margins, base rounded or subcordate; midrib short; sheaths smooth, inflated, somewhat auricled at the mouth, compressed, with ciliate margins; ligule a narrow membrane. Panicle about 5 cm. long and broad, triangular; rhachis and branches slender, stiff, smooth, the lower branches sometimes deflexed. Spikelets very narrow, 20 mm. long (including the awn), sessile or pedicellate. Floral glume about 1·cm. long excluding the awn), lanceolate, with 5 strong nerves, the lateral nerves forming thickened margins, hairy on the nerves outside, tapering into a long scaberulous awn as long as the body of the glume; palea as long as the glume.

Distribution: Of genus.

The seeds are sweet, acrid; oleaginous, digestible, cooling; astringent to urinary tract; useful in biliousness; cause flatulence and constipation (Ayurveda).

Bengal: Uridhan—; *Canarese:* Jyarahumedhe—; *Gujerati:* Vanti—; *Hindi:* Janglidal, Tili, Tini—; *Malayalam:* Nirvallipullu—; *Marathi:* Deobhata—; *North-Western Provinces:* Parsal, Passahi, Passai, Passari, Tinni—; *Punjab:* Pastal—; *Sanskrit:* Aranyadhanya, Aranyajali, Munidhanya, Nivara, Prasadhika, Trinadhanya, Trinodbhava, Vanavrihi—; *Sinhalese:* Gojabba—.

COIX Linn.

Tall leafy monoecious annual or perennial grasses; stem branching, spongy within. Leaves long, flat, broad. Racemes many, axillary and terminal; lower spikelets solitary, female, enclosed in an ultimately hardened, polished, nut-like bract, through the apex of which the male portion of the spike protrudes. Male spikelets 2-3-nate at each node of the rhachis, 1-sessile and 1 or 2 pedicellate, lanceolate. Glumes 4; involucral glumes subequal, empty, rigid or herbaceous; lower involucral glume winged along the inflexed margin; upper involucral glume not winged; floral glumes hyaline, paleate, triandrous or empty. Female spikelets ovoid, acuminate. Glumes 4; lower involucral glume chartaceous, the other 3 glumes becoming successively thinner; upper floral glume paleate. Lodicules 0. Staminodes minute. Ovary ovoid; styles 2, free, slender. Grain orbicular, ventrally furrowed, enclosed in the hardened globose ovoid or cylindric involucre.—Species 5 or 6.—Hot countries of the Old World.

C. lachryma-jobi Linn. is used medicinally in China, Malaya, Indo China, the Philippine Islands, and La Reunion.

1. **Coix lachryma-Jobi** Linn. Sp. Pl. ed. 1, 972.

Stem 0.9-1.5 m. high or more, stout, rooting at the lower nodes; internodes smooth, polished. Leaves 10-45 by 2.5-5 cm., narrowed from a broad cordate base to an acuminate tip, smooth on both surfaces, with slender nerves and spinulosely serrate margins; midrib stout; sheaths long, smooth; ligule a very narrow membrane. Racemes 2.5-6.3 cm. long, nodding or drooping from long peduncles; rhachis within the bract slender, above the bract stout, notched at the nodes. Male spikelets 10-13 mm. long, subsecund, imbricating. Lower involucral glume 10 mm. long, elliptic-lanceolate, acute, concave, many-nerved, with inflexed margins and with a narrow wing arising from a little above the edge of the margin with many branched green veins; upper involucral glume similar to the lower but not winged, 5-9-nerved; lower floral glume oblong-lanceolate, hyaline, paleate, triandrous, faintly 3-5-nerved; upper floral glume similar, paleate, triandrous or empty. Anthers 5 mm. long, orange. Fruit from broadly ovoid to globose, bluish grey, 6-10 mm. long, smooth, polished.

Distribution: Tropical Asia.—Cultivated in Africa and America.

The seed is bitter with flavour; reduces the weight of the body; useful in kapha (Ayurveda).

The seed is used as a tonic and diuretic (Yunani).

Among the Santals the root is given in strangury and in the menstrual complaint known as "silka" (Campbell).

The kernels deprived of their shells are used as a food and medicine throughout China, Malaya, Indo China, the Philippines, and in La Reunion. They make an excellent diet-drink for invalids, and have diuretic and cathartic properties. They are also employed for lung and chest complaints.

In Tongking, the grains are considered a good blood purifier and excellent diuretic.

The root is not an antidote to snake-venom (Mhaskar and Caius).

Afrikaans: Jobstrane—; *Arabic:* Damudud—; *Ashanti:* Akrokosaibia—; *Assam:* Koamonee, Sohriu—; *Balaghat:* Gurlu—; *Bengal:* Gurgur, Kunch—; *Bombay:* Kassaibija—; *Bundelkhand:* Ganddula, Garun—; *Burma:* Cheik, Kalithi, Kyeikphun, Kyeit, Sakyeik—; *Cachar:* Jhonki—; *Central Provinces:* Galbi, Ganddula, Kasei—; *Chanda:* Gadi, Galbi, Kasei—; *Chinese:* I I Jen, Kiai Li, T'u I Mi—; *Cutch:* Dhamra—; *English:* Job's Tears—; *French:* Larmes de Job, Larmillé des Indes—; *Gujerati:* Kasai, Ranzondlo—; *Hindi:* Baru, Dabhir, Ganduta, Garahadua, Gargaridhan, Garun, Gulbigadi, Gurlu, Kaiya, Kasei, Sankhlu, Sankhru, Sankru—; *Igorrote:* Agda—; *Jaintia Hills:* Sohriu—; *Karen:* Be, Bema—; *Khasia Hills:* Sohriu—; *Konkani:* Ranzondlo, Ranzonnalo—; *La Reunion:* Job—; *Lushai Hills:* Mim—; *Malay:* Jilai batu, Mulai tikus, Ringuiringui—; *Malaya:* Yee mai, Yee yin—; *Malta:* Dmuh ta Giobb, Hara tac Ciaul, Job's Tears, Lacrima di Giobee, Zibeg tal curum—; *Manipur:* Changmimkhombi, Mim, Mung—; *Marathi:* Ranjondhala, Ranmakkai—; *Mount Abu:* Dabhir—; *Mundari:* Bakrihoreng, Horeng, Loeonghoreng—; *Naga Hills:* Kasi, Kesi, Koasangti, Kudhati, Kudhiathia, Sikrakravu, Sotsa—; *New Caledonia:* E' Houa—; *North-West Provinces:* Sankru—; *Poona:* Jondhali—; *Portuguese:* Lagrimas de Jon—; *Punjab:* Sanklu—; *Rajputana:* Dabhir—; *Sabathu Hills:* Sanklu—; *Saharanpur:* Baru—; *Sanskrit:* Gavedhu, Gavedhuka, Gavedu, Gojivha, Gundraguttha, Jargadi—; Kshudra, Kunta—; *Santali:* Jargadi—; *Seoni:* Galu—; *Sinhalese:* Karibu, Kikirindi, Kirindimana, Kukirrindi—; *Tagalog:* Tegbe, Tigbi—; *Twi:* Owu-ammang-mankang-m'asaim—; *Visayan:* Adlay—.

POLYTOCA Br.

Tall stout erect branching annual or perennial leafy monoecious grasses; stem spongy within; nodes bearded; flowering branches fascicled. Leaves long, flat. Inflorescence of spike-like racemes, terminating the branches, at first enclosed in spathiform bracts; racemes all male or with one or more female spikelets at the base. Male spikelets 2-flowered, sometimes imperfect. Glumes 4 (with sometimes a terminal rudimentary one), all subequal in length; involucral glumes empty; lower involucral glume herbaceous, shallowly concave, many-nerved, with a narrow membranous margin; upper involucral glume narrower, ovate, acuminate, 5-9-nerved; lower floral glume membranous, oblong, acuminate, 3-5-nerved; paleate, triandrous; upper floral glume very slender, linear, hyaline, paleate, triandrous or empty. Lodicules 2, cuneate. Anthers long. Female spikelets broadly oblong, 1-flowered; lower involucral glume thickly coriaceous, closely embracing the rhachis of the spike by its involute margins, with many obscure nerves, the other 3 glumes enclosed in the lower involucral glume, hyaline; upper involucral glume oblong, many-nerved; lower floral glume narrower, oblong, 3-5-nerved, empty; upper floral glume very narrow, truncate, 3-nerved, paleate. Styles very long; stigmas slender. Grain small, fusiform, terete, enclosed in the nut-like polished hardened glume.—Species 5.—Indo-Malaya.

The genus is therapeutically inert.

1. **Polytoca barbata** Stapf in Fl. B. I. VII (1896) 102.—*Coix Koenigii* Spreng. Syst. I, 228.

Stem 0.9-1.8 m. high, as thick as the little finger below, terete, smooth; nodes softly-bearded. Leaves 15-30 by 0.6-2.2 cm., linear, acuminate, scabrid above, with a stout midrib and scabrid margins; sheaths long, smooth, glabrous or hairy; ligule a narrow ridge. Racemes paniculate, on slender peduncles; spathiform sheaths 2.5 cm. long (or more), with a long awn at the tip; proper sheaths 13 mm. long, oblong, awned; male portion of the raceme appearing as if sessile on the top of the female spikelet, articulate with the internode below it which is embraced by the margins of the outer glume of the female spikelet; rhachis hardly articulate between the male spikelets. Male spikelets reaching 10 mm. long. Lower involucral glume 8 by 4 mm., ovate, acute, concave, pubescent. Female spikelets 4 mm. long, glabrous. Glumes 4; lower involucral glume thickly coraiceous, white, shining, closely wrapped round the rhachis of the spike and the other glumes, obscurely many-nerved; tip entire.

Distribution: More or less throughout India, Ceylon.—Java.

The plant is bitter, sweet; cooling and tasty; tonic; laxative, aphrodisiac; useful in burning sensations, strangury, phthisis, vesical calculi, diseases of the blood, biliousness, hæmorrhagic diathesis (Ayurveda).

Balaghat: Kadpi—; *Bengal:* Gurgur, Kesheghansa—; *Canarese:* Kajalu—; *Central Provinces:* Kadpi—; *Chanda:* Kirmagilaramgadi—; *Gujerati:* Kansado—; *Hindi:* Kansa—; *Konkan:* Kasada—; *Marathi:* Kasai, Varival—; *Sanskrit:* Amarapushpaka, Ashvabaḷa, Chamarapushpa, Darbhapatraka, Ikshugandha, Ikshura, Ishika, Kanda, Karmamula, Kasekshu, Kasha, Nadeya, Niraja, Potagala, Sharada, Shiri, Sukanda, Vanahasaka—; *Telugu:* Ghellagadi—.

ZEA Linn.

Tall, stout, annual grasses with large leaves, the axils of the lower bearing the female inflorescences (cobs), tightly enveloped by large membranous bracts. Sexes in different inflorescences on the same plant. Male inflorescence terminal, or panicled spike-like racemes with 2-nate spikelets shortly unequally pedicelled or one sessile on the inarticulate rhachis, both similar, 2-flowered, awnless. Glumes subequal, membranous, convex, obscurely 2-keeled, 9-10-nerved. Valves more or less hyaline, 3-5-nerved; valvules similar, 2-nerved, obscurely keeled; lodicules 2, fleshy. Stamens 3; anthers linear. Female spikelets 2-nate in 4-11 longitudinal rows, slightly immersed in the spongy axis of the cob, with a lower baren and an upper fertile floret, awnless. Glumes similar, very broad, fleshy below, hyaline above, nerveless, ciliate. Lower valve resembling the glumes, but shorter and ciliate, with or without a similar but smaller valvule; upper valve similar to the lower with a valvule about as long as the ovary. Lodicules 0. Ovary obliquely ovoid. Style very long, 2-fid at the tip, papillose upwards, exserted in long silky tassels from the sheathing bracts. Grain large, subglobose or dorsally more or less flattened, surrounded by the dried up glumes, valves and valvules; scutellum large, equalling or exceeding 2/3 of the grain.—Species 1.—Native of America.

Z. mays Linn. is used medicinally in Europe, China, Cambodia, and the Philippine Islands.

OFFICIAL :—The stigma of *Z. Mais* Linn. in Belgium, France, Turkey; *Z. Mays* Linn. in Spain; *Z. Mays* Linn. (*Z. vulgaris* Mill.) in Portugal.

The starch from the grains of *Z. Mays* Linn. in Great Britain and the United States of America.

1. **Zea mays** Linn. Sp. Pl. ed. 1, 971.
Characters of the genus.

Distribution: Cultivated widely in India.

The grain is an appetiser; fattening; cures "kapha" and biliousness; causes flatulence (Ayurveda).

A decoction of the grain is used as a hip-bath for piles; lessens pain (Yunani).

It is considered by Mahomedan physicians to be resolvent, astringent, and very nourishing; they consider it to be a suitable diet in consumption and a relaxed condition of the bowels.

In the Konkan, an alkaline solution is prepared from the burnt cobs and is given in lithiasis.

In Europe, the grain is boiled and made into emollient poultices. It is much used as a valuable article of diet for invalids and children.

In Greece, the silky stigmata are used in decoction in diseases of the bladder, and have lately attracted attention in America under the name of *Corn silk*, of which a liquid extract is sold in the shops as a remedy in irritable conditions of the bladder with turbid and irritating urine; it has a marked diuretic action. The meal has been long in use in America as a poultice, and gruel is also made of it.

The whole plant is considered diuretic in the Philippine Islands, and a decoction of the stigmas or the stalks is a common remedy for affections of the bladder and kidneys

In Cambodia, the seeds are prescribed in angina and the stigmas in paludism.

Afghanistan: Jaoari, Jaori, Jaorikhurdani—; *Afrikaans:* Mielie—; *Annam:* Bap ngo, Lua ngo—; *Arabic:* Durahkizan, Durahshami, Hintaherunu, Khalavan, Khandaruz, Zurratulmakkah—;

Ashanti: Aburow—; *Awuna:* Akple—; *Bengal:* Bhutta, Janar—; *Bombay:* Buta, Makai—; *Brazil:* Zaburro—; *Burma:* Pyaungbu—; *Cambodia:* Paut, Put—; *Canarese:* Goinjol, Mekkejola, Musukujola—; *Ceylon:* Cholum—; *Chinese:* Yu Shu Shu—; *Chota Nagpur:* Jonar—; *Cochin China:* Bap ngo, Lua ngo—; *Deccan:* Makkajari, Makkajowari—; *Dutch:* Mais—; *English:* Indian Corn, Maize—; *Ewe:* Akple, Blikple—; *Fanti:* Aburow—; *French:* Blé de Barbarie, Blé d'Espagne, Blé de Guinée, Blé d'Inde, Blé d'Italie, Blé de Rome, Bléture, Blé de Turquie, Froment des Indes, Graine de Turquie, Maïs, Maïz, Mil d'Espagne, Gros millet des Indes, Troquet, Turquet, Turquie—; *Ga:* Able—; *Garhwal:* Junala, Mungari—; *German:* Tuerkische Korn, Tuerkisher Weizen—; *Gujerati:* Makkari—; *Hasada:* Jonra—; *Hausa:* Masara—; *Hindi:* Barajuar, Bhutta, Jawdra, Junri, Kukri, Makai, Makka—; *Hova:* Katsabotso, Katsamanga, Katzaha, Tsako, Tsakotsako—; *Italian:* Grano siciliano, Grano turco, Melicatto, Meliga—; *Kashgar:* Conac—; *Kila Saifulla:* Makai, Maki—; *Konkani:* Maeo, Zonallo, Zondllo—; *Krepi:* Adakple, Blikple, Kple, Kpledzi, Watsikple—; *Krobo:* Blaifo—; *Kumaon:* Bhutta, Junala, Mukni—; *Languedoc:* Artho, Avari, Avati, Blamari, Blarama, Garouilhe, Garouillet, Millaral, Millargo, Millargou—; *Laos:* Khao phot, Khot—; *Madagascar:* Katsabazaha, Katsakandevolahy, Sako—; *Malayalam:* Cholam—; *Malta:* Frumentone, Granoturco, Indian Corn, Kamh irrum, Maize—; *Marathi:* Maka—; *Moldavia:* Popusoiu—; *Mundari:* Gorajonra, Gurulujonra, Jonra, Loeongjonra—; *Naguri:* Jondra—; *North-West Provinces:* Barajuar, Bhutta, Junri, Maka, Makai, Makka—; *Persian:* Bajri, Gaudumemakkah, Khoshahemakki—; *Philippines:* Borona, Maiz—; *Portuguese:* Milho, Milho-grosso—; *Punjab:* Barajuar, Chhale, Juar, Kukri, Kuthi, Mak, Makkei, Makki—; *Rajputana:* Mukka—; *Roumanian:* Porumb—; *Russian:* Kukuruva, Mais—; *Sanskrit:* Kandaja, Mahakaya, Makaya, Samputantastha, Shikhalu, Yavanala—; *Santal:* Jondra—; *Sarakhala:* Makai, Maki—; *Shahrig:* Badagharjuari—; *Sind:* Barajuar, Makkai—; *Sinhalese:* Bada iringu—; *South Africa:* Mealies—; *Spanish:* Maiz, Trigo de las Indias, Trigo de-Turquia, Zara del Peru—; *Suto:* Poone—; *Tamil:* Makkasholam—; *Telugu:* Makkazonnalu, Mokkajanna—; *Toba:* Makai—;

Tongking: Bap ngo, Lua ngo—; *Transsylvania:* Cucuruz—; *Turkish:* Misir—; *Twi:* Aburow—; *Urdu:* Makai—; *Uriya:* Buta, Maka—.

SACCHARUM Linn.

Perennial tall herbs. Leaves various. Panicle large, often silvery, silky and showy, spikelets usually surrounded by long silky hairs from the base, all alike, binate, one sessile, the other pedicelled on the articulate fragile rhachis of panicled racemes, the pedicelled falling from their pedicels, the sessile deciduous together with the contiguous joint of the rhachis and pedicel. Florets 2, the lower reduced to an empty valve, the upper hermaphrodite. Involucral glumes equal, often chartaceous to subcoriaceous towards the base, membranous to subhyaline upwards; the lower glume with inflexed margins and in the sessile spikelet usually with an even number of nerves; upper glume 1-, 3-, or 5- nerved. Floral glumes hyaline; upper with a terminal bristle-like usually straight awn, or mucronate, or muticous, or 0. Lodicules 2, cuneate. Stamens 3. Stigmas laterally exserted. Grain oblong to subglobose; embryo short to half the length of the grain or more; hilum basal.—Species 37.—Tropics and subtropics.

A. Hairs on callus much exceeding the spikelet. Glumes I and II not dorsally villous	
1. Culms not leafy above, under 18 mm. diam. Leaves under 20 mm. in width. Glumes I and II ciliate	4. *S. spontaneum.*
2. Culms densely leafy above, over 2.5 cm. diam. Leaves over 2.5 cm. in width. Glumes I and II glabrous	1. *S. officinarum.*
B. Hairs on callus of sessile spikelet shorter or not much longer than spikelet. Glumes I and II often dorsally villous	
Nodes of culm not bearded. Sheaths not hirsute. Glumes I and II dorsally villous	
a. Foliage not glaucous. Culms densely leafy above. Sessile spikelet shorter than internodes	2. *S. arundinaceum*
b. Foliage glaucous. Culms not leafy above. Sessile spikelet longer than internode of rhachis	3. *S. munja.*

S. officinarum Linn. is used medicinally in China, the Philippine Islands, La Reunion, Guiana, and Brazil. In Portugal, Spain, Switzerland, and the United States it is recognized as the officinal source of sucrose or saccharose.

1. **Saccharum officinarum** Linn. Sp. Pl. ed. 1, 54.—PLATE 1014B.

Stêms up to 6 m. high, many-noded, glabrous or pubescent below the panicle, more or less coated with wax below the nodes. Leaf-sheaths tight, terete, smooth, glabrous except when young; ligules very short, membranous, ciliate; blades linear-lanceolate, up to 1.5 m. long and over 5 cm. broad, green above, glaucous below, more or less scribid along the margins, midrib very stout, rounded on the back, more or less flat above. Panicles pyramidal, up to 1 m. long, dense silvery; primary rhachis glabrous except on the pubescent nodes, or more or less silky; primary branches verticillate or semi-verticillate, very slender, glabrous or hairy. Racemes up to 10 cm. long, very fragile; joints and pedicels filiform, more or less ciliate or glabrous, the joints variable in length, the pedicels much shorter. Spikelets lanceolate, up to 4.2 mm. long, surrounded from the callus by a tuft of long silky hairs up to 9 mm. long. Involucral glumes subequal, lanceolate, firm towards the base, otherwise subhyaline, the lower acute, 2-nerved to sub-4-nerved, glabrous, the upper very similar, 1-3-nerved, glabrous or ciliolate. Lower floral glume oblong, acute or subacute, hyaline, nerveless, ciliate, about 3.3 mm. long, upper floral glume subacute, ciliate, as long as the lower or 0. Pale, if present very minute, obovate, ciliate. Lodicules broad, cuneate, sparingly ciliolate from the top. Stigmas purplish, 2.1 mm. long. Grain oblong, attenuated upwards, subterete, flesh-coloured; embryo 1/6 the length of the grain.

Distribution: Grown everywhere in India.—S. Asia very likely the original home of the species.

Sugar-cane is sweet; oleaginous, indigestible; diuretic, tonic, cooling, aphrodisiac, useful in fatigue, thirst, leprosy, intestinal troubles, anæmia, erysipelas; causes "kapha", ulcers, inflammations.—Sugar is sweet; oleaginous, aphrodisiac, diuretic; causes intoxication, "kapha", intestinal worms (Ayurveda).

Sugar-cane is sweet, laxative, diuretic, fattening, aphrodisiac; purifies the blood; good for the lungs; bad for the liver (Yunani).

The roots are considered cooling and diuretic, and the stem a good bechic.

The Hindus set a great value upon sugar, and in medicine it is considered by them as nutritious pectoral, and anthelmintic.

In Arabian works on Materia Medica, sugar is described as detergent and emollient. Many writers speak of it as attenuant and pectoral. It has also been supposed to have virtues in calculous complaints.

In the Punjab, sugar is considered heavy, tonic, and aperient, useful in heat delirium and disorders of the bile and wind.

In Cambodia, sugar-cane enters into the composition of remedies used for the treatment of ulcers of the skin and mucous membranes. A decoction of the stem is given in diarrhœas of childhood.

In cases of poisoning by copper, arsenic or corrosive sublimate, sugar has been successfully employed as an antidote, and white sugar finely pulverised is occasionally sprinkled upon ulcers with unhealthy granulation.

Whether administered internally or applied externally every part of the sugar-cane is useless in the treatment of snake-bite (Mhaskar and Caius).

Ada: Afunu—; *Annam:* Mia—; *Arabic:* Kasabishakar, Kasibshakar, Qasabussakar—; *Awina:* Fofongu—; *Behar:* Katari, Ketari, Khusiyar, Ukh, Ukhi—; *Bengal:* Ak, Ganna, Ik, Kajuli, Kulluar, Kushiar, Puri, Uk—; *Bombay:* Gol, Serdi, Us—; *Brazil:* Canna, Canna de assucur, Tacamaree, Viba—; *Burma:* Keyan, Kyan—; *Cagayan:* Agbo—; *Cambodia:* Ampeou, Ampon—; *Canarese:* Ikshu, Ikshudanda, Ingolu, Kabbu, Kantara, Kantaraka, Madhura, Marakabbu, Pundra, Rasadali, Rasala, Rastale, Tanigarbu, Trinaraja—; *Catalan:* Cana dolsa, Cana de sucra—; *Ceylon:* Karambu—; *Chinese:* Kan Che, Sha T'ang, Shih Mi—; *Cochin China:* Mia—; *Deccan:* Ganda, Us—; *Dutch:* Suiker riet—; *English:* Sugar Cane—; *Ewe:* Fofongu, Bogleng—; *Fanti:* Ahwerenkakraba—; *French:* Canamelle, Cannamelle, Canne de Batavia, Canne de la Chine, Canne d'Haiti, Canne à sucre, Roseau à sucre—; *French Guiana:* Canne à sucre—; *Ga:* Sheng—; *German:* Zuckerrohr—; *Gujerati:* Naisakar, Serdi, Sheradi, Sherdi, Uns—; *Hausa:* Karansariki, Rake—; *Hindi:* Ganna, Ikh, Kumad, Naishakar, Rikhu, Uk, Ukh—; *Hova:* Fary— *Japanese:* Kansia—; *Java:* Tebu—; *Konkani:* Uny, Uss—; *Krepi:* Bogleng, Boglengbiri, Boglengfe, Boglengyibor—; *Korbo:* Ahleu—; *Kumaon:* Rikhu—; *La Reunion:* Canne—; *Madagascar:* Fary—; *Malayalam:* Darbheshu, Ikshu, Kantarakam, Karimpu, Madhutrinam, Vellakarimpu—; *Marathi:* Aos, Kabbo, Us, Usa—; *Mundari:* Gurdanda, Gurkatauri, Gurkosear—; *Nepal:* Akali, Chaku, Uk—; *Newar:* Tu—; *New Caledonia:* Ariva, Arolam, Boiepe, Boinlioua, Delenole, Dilou, Dogangueni, Gadenadeboui, Goreate, Jate, Kabopolenouen, Kiaboue, Kinemaite, Kondimoua, Koubala, Maiou, Mebouangue, Mengou, Migao, Moene, Moindiene, Moueouete, Ngala, Niemba, Ouali, Ouane, Oudiepe-ait, Ouen, Ouen ebail, Ouen mangia, Ouen ou poudendate, Paiambou, Paieme, Pidiak, Pobone, Poilote Schimate, Sthiabanghi, Tangalite, Thsiogan, Tilibi, Tshiambo—; *North-West Provinces:* Ganna, Ikh, Ikhari, Kanthirikhu, Punarikhu, Rikhu, Ukh, Ukhari—; *Parbuttiah:* Ghenra—; *Persian:* Naishakar—; *Portuguese:* Canna de assucar, Canna doce—; *Punjab:* Ganna, Ikh, Kamand, Khand, Paunda, Shakarsurkh—; *Roumanian:* Trestie de zahar—; *Russian:* Saharnyi trastnik—; *Sakalave:* Fisika—; *Sanskrit:* Adhipatra, Asipatra, Bhurirasa, Dirghachhada, Gandidi, Gudada, Gudadaru, Gudakashtha, Gudamula, Gudatrina, Ikshu, Ikshura, Kantara, Kantaraka, Karkotaka, Khadgapatraka, Koshakara, Madhutrina, Madhuyashti, Maharasa, Mrityupushpa, Payodhara, Pundraka, Rasala, Rasalu, Sastra, Sukumasaka, Trinadhiya, Vansha, Vipularasa, Vrishya—; *Santali:* Akh, Ikhshu—; *Sind:* Kamand—; *Sinhalese:* Uk, Ukgas—; *Sokoto:* Arakke—; *Spanish:* Cana de azucar, Cana dulce, Canamiel—; *Tagalog:* Tubo—; *Tamil:* Angarigai, Asibattiragam, Ikku, Kalai, Kannal, Karumbu, Madudirunam, Paruvayoni, Pundaram, Ukkiragandam, Ukkiragandi, Velam, Vengarumbu—; *Telugu:* Arukanupulakranuga, Cheraku, Cherakubhedamu, Ikshupu. Inju, Kantaramu, Kanupulacheraku, Lavucheraku, Pottikamupucheraku, Tellacheraku, Tiyyamranu, Tunta, Vamsukamu—; *Tongking:* Mia, Mia co ke, Mia lau Mia ly—; *Tulu:* Karumbu—; *Twi:* Ahwereu—; *Urdu:* Gana—; *Uriya:* Aku, Gudodaru, Ikhyu—; *Visayan:* Quilaba—.

2. **Saccharum arundinaceum** Retz. Obs. Bot. fasc. 4. (1786) 14.—Plate 1014A.

A gigantic tufted grass. Culms biennial (? or triennial), somewhat with the habit of the sugar-cane, branched, often 5 m. high, the flowering culms sometimes nearly 9 m. high and over 18 mm. diam., solid. Stem glabrous, smooth, or slightly rough with very long internodes. Blade reaching 1.8 m. in length and 5 cm. in breadth; with rib stout and as broad as the blade at base, keeled below, villous with long silky hairs above, margins cutting. (According to Hole the midrib in basal leaves occupies at base one-third or less of the width of the blade). Upper cauline leaves becoming folded and filiform. Leaf-sheaths glabrous. Ligule truncate with a ring or tuft of long silky hairs 6-25 mm. distance from its base. Panicle 60 cm. to 1.2 m. long, pink, white or silvery, diffuse while flowering, with smooth glabrous axis, main branches tufted on the axis, tufts alternate or subverticillate. Spikelets 2.5-3.7 mm. long, much shorter than the internodes of the spike. Pedicel one-third to equal the length of the sessile spikelet. Joint usually longer than sessile spikelet; majority of pedicels shorter than proper joint. Callus-hairs pale, not dense, as long as spikelet (according to Hole shorter than or subequal to spikelet). Hairs of joint overtop the joint by less than to 1½ times the length of the joint. Sessile spikelet: Lower involucral glume chartaceous, dorsally sparsely villous, villi overtopping the glume by about 1¼ the length of the glume. Upper involucral glume chartaceous, not villous dorsally. Lower floral glume not villous dorsally. Mucro of upper floral glume not exserted beyond apex of spikelet. Pale ciliate. Pedicelled spikelet: Involucral glumes dorsally villous, villi overtopping spikelet by 1-1½ times the length of the spikelet. Spikelet sometimes 2-3-flowered with 1-2 additional paleate glumes inside the floral glumes.

Distribution: Bengal, Assam, Burma, extending into China.—Frequently cultivated in gardens throughout India.

The root is demulcent and diuretic.

Bengal: Teng—; *Burma:* Phoungga—; *Canarese:* Abbe, Baragu, Lekhinihullu, Munja, Munji, Nala, Rellu, Sara—; *Ceylon:* Elephant

Grass—; *English:* Devil Sugar Cane, Reedy Sugar Cane, Wild Sugar Cane—; *Malay:* Tebrau—; *Malayalam:* Mekhalapullu, Munja, Sarappullu—; *Punjab:* Sarkanda—; *Rajputana:* Sarpat—; *Sanskrit:* Gundra, Munja, Sara, Tejanaka—; *Sinhalese:* Rambuk—; *Tamil:* Elhudugirananal, Munji—; *Telugu:* Adavicheruku, Bramhamekhalamu, Gundra, Kondakanamu, Munjagaddi, Mungamu, Nadamu, Polagaddi, Ponika, Ponugu, Saramu—; *Uriya:* Kantosoro, Soro—.

3. **Saccharum munja** Roxb. Fl. Ind. I (1832) 246.—*S. ciliare* Anders. in Oefvers. K. Vet. Akad. Förhand. Stockh. (1855) 155.

An erect grass, attaining a height of 5.5 m. and 12 mm. diam., pale straw-coloured, smooth, striate, solid. Leaf-sheath shortly silky at extreme base, otherwise quite smooth, striate, pale straw-coloured, villous on margins at apex with long white hairs usually much longer than proper internode, uppermost sheath sometimes extending beyond the base of the panicle. Upper leaf of flowering culm 22-70 cm. long, flat, tapering from the base, long-acuminate, 5-10 mm. broad. Lower leaves up to 2 and 2.4 m. by 25 mm., but usually only 18 mm. broad. In basal leaves the concave midrib occupies ½ or more of width of blade. Colour glaucous, midrib white. Margin scabrid as are one or more intramarginal nerves below, otherwise smooth, but densely white villous at base behind the ligule. Ligule truncate, usually a narrow membranous rim, of upper leaves longer, attaining 3 mm., minutely silky dorsally and ciliate. Flowering panicle 30-90 cm. long, usually lanceolate, pale cream-coloured to dark reddish purple, branches spreading. Fruiting panicle oblong, branches appressed to the axis, white to greyish white. Primary rhachis glabrous, sulcate, more or less scabrid on the ridges. Primary branches subverticillate, compound. Ultimate branchlets triquetrous, more or less villous with long white hairs on angles and on two faces. Spikelets in pairs, one pedicelled and one sessile on the capillary jointed branches and branchlets of a terminal panicle, awnless, lanceolate, up to 5 mm. long; sessile and pedicelled similar, each one-flowered and hermaphrodite. Pedicelled fruiting spikelet falling from the pedicel, the sessile spikelet falling later with the attached pedicel and joint of axis. Joint of axis triquetrous, $\frac{1}{2}$ to subequal the sessile spikelet, but usually shorter than the spikelet, villous on two faces and on margins, the villi overtopping the joint by once to twice the length of the joint. Pedicells triquetrous, $\frac{1}{3}$-$\frac{3}{4}$ the length of the sessile spikelet, villous with long white hairs on two faces and on the angles. Most pedicels shorter than proper joint, rarely subequal to the proper joint. Sessile spikelets: Lower involucral glume lanceolate, chartaceous, with two strong lateral nerves and usually 1-4 more or less distinct additional nerves, dorsally long villous on basal half or two-thirds, the hairs overtopping the glume by about the length of the glume, scabrid dorsally on keels, margin inflexed, sparsely ciliate above, apex minutely bidentate to entire. Upper involucral glume subequal to the lower, lanceolate, chartaceous, keeled, with one strong central nerve and usually 2-4 more or less distinct additional nerves, glabrous dorsally or minutely pubescent towards apex, scabrid dorsally on keel, margins incurved, ciliate above, apex usually shortly mucronate. Lower floral glume oblong-lanceolate, hyaline-membranous or little shorter than the upper involucral glume, 1-3-nerved, margins incurved, ciliate, apex acute or short mucronate. Upper floral glume broad-lanceolate to elliptic, shorter than or subequal to the upper involucral glume, hyaline, 1-3-nerved, mucronate, ciliate, mucro short to 1.25 mm. long, but not exserted beyond the apex of the spikelet. Pale ovate hyaline, ciliate, from $\frac{1}{3}$-$\frac{3}{4}$ the length of the upper floral glume. Pedicelled spikelets similar, but both the involucral glumes are dorsally long villous and usually with 3-5 strong nerves and occasionally 2 additional fainter ones. Lodicules 2, cuneate, glabrous, 0.5 mm. long. Anthers 3, pale yellow to purple, 2-2.5 mm. long. Stigmas yellow, often tinted with purple, 1-1.5 mm. long.

Distribution: N. India in the Punjab and Upper Gangetic Plain.

The stem is sweet, acrid; cooling, aphrodisiac; useful in burning sensations, thirst, erysipelas, blood troubles, urinary complaints, eye diseases, tridosha (Ayurveda).

The root is burnt near women after delivery, and burns and scalds, its smoke being considered beneficial (Stewart).

Ajmere: Sara, Sarpat—; *Bengal:* Muncha, Ramshara, Sar, Sara, Sarpata, Shar—; *Bolan River:* Kash—; *Hindi:* Munja, Ramsar, Sara, Sarkanda, Sarkara, Sarpat, Sarpatta—; *Marathi:* Mole—; *North-West Provinces:* Ikar, Patawar, Sarhar, Sarkanda—; *Oudh:* Palwa—; *Pishin:* Surghashae—; *Punjab:* Kanda, Kharkana, Sarjbar, Sarkara—; *Quetta:* Surghashae—; *Sanskrit:* Bahupraja, Bana, Bhadramunja, Brahmanya, Chakshuveshtana, Darbhavhaya, Dridhatrina, Durmula, Ikshukanda, Maunji, Munja, Munjanaka, Munjata, Ranjana, Shakrabhanga, Shara, Shiri, Sthuladarbha, Sumekhala, Tejana, Tejanavhaya, Trinakhaya, Vaniraka—; *Santali:* Sar—; *Telugu:* Gundra, Ponika—; *Trans-Indus:* Darga, Karre—; *Turbat:* Dil—.

4. **Saccharum spontaneum** Linn. Mant. (1771) 183.

A tall erect grass reaching sometimes 6 m. high; stem erect from a stout rootstock, solid, smooth, polished, silky beneath the panicle. Leaves 30-75 cm. by 3-6 mm., narrowly linear, finely acuminate, rigid, coriaceous, usually glabrous, often with convolute margins; sheaths smooth, with fimbriate mouth; ligule ovate, membranous. Panicle 20-60 cm. long, lanceolate, silky-hairy; rhachis slender; branches 3-5-nate, 5-10 cm. long; rhachis of racemes almost capillary, fragile. Spikelets 4 mm. long, lanceolate; callus minute, bearded with spreading silky hairs 13 mm. long. Glumes 4; lower involucral glume lanceolate subulate, acuminate; upper involucral glume equal to the lower, lanceolate, obscurely keeled, 1-nerved; lower floral glume ovate-lanceolate, subacute, ciliate, hyaline, nerveless; upper floral glume very slender, ciliate; palea minute, ciliate.

Distribution: Throughout India, Ceylon.—S. Europe and warm regions of the Old World, E. Australia.

The plant has the same properties as *Polytoca barbata* (Ayurveda)

Bengal: Kagara, Kas, Kash, Kashiya, Khagra—; *Burma:* Thekkaygyee, Thetkiakyn—; *Canarese:* Darbhe, Hodakehullu, Mutullahullu—; *Central Provinces:* Kans, Khan, Padar—; *English:* Thatch Grass, Wild Sugar Cane—; *Gujerati:* Kans, Kansado, Kansadoghas—; *Hasada:* Karetasad, Karitasad, Pirikare—; *Hausa:* Kyamo, Kyamo kibiya, Kyauro, Kyauro kibiya, Sheme, Sansari, Abokin—; *Hindi:* Kagara, Kans, Kansi, Kas, Kosa, Kus—; *Kumaon:* Jasha, Jhaush, Kash—; *Malayalam:* Nannana—; *Marathi:* Kagara—; *Naguri:* Kasitasad—; *North-Western Provinces:* Kans, Kansa, Kansi—; *Oudh:* Khagar, Rara—; *Punjab:* Kahi, Kanh, Kans, Sarkara—; *Rajputana:* Kans, Kash, Kashi—; *Sadani:* Kasighas—; *Sanskrit:* Ikshugandha, Kasa, Kasha, Khaggara—; *Sind:* Kahu, Khan, Khau—; *Tamil:* Achabaram, Anjani, Eruvai, Kosangam, Kucham, Kumil, Kurbagam, Nanal, Nanarbul, Nanmugappul, Peykkarumbu, Sangabidam, Saravanam, Sarupparasi, Sasabaram, Sugattan, Suvedasaram, Tittiru, Tittiruchi, Tuttam, Vedasam—; *Telugu:* Billugaddi, Kakicheraku, Kakiveduru, Koregadi, Rasalamu, Rellugaddi, Vetticheraku—; *Uriya:* Chhatiagaso, Inkoro, Kaso, Khhodi, Pothhorokhhodi—.

MANISURIS Linn. f.

Annual erect slender leafy grasses. Leaves flat, cordate. Racemes small, terete, axillary and terminal, shortly pedunculate; rhachis green, ultimately fragile, glabrous, with short broad internodes excavate opposite the sessile spikelets. Spikelets minute, in dissimilar pairs, one globose, sessile, 2-sexual, the other ovate, pedicellate, male or neuter, the pedicel adnate or closely appressed to the joint of the rhachis. Sessile spikelets: glumes 4; lower involucral glume hard, globose, foveolate, coriaceous at length crustaceous, with an oblong opening opposite the rhachis; upper involucral glume minute, oblong, coriaceous, 1-nerved, closing the orifice of the lower involucral glume; lower floral glume very minute, hyaline, orbicular, empty; upper floral glume and its palea hyaline, broadly oblong. Lodicules 2, subquadrate. Anthers minute. Styles and stigmas short.—Species 1.—Throughout the tropics.

1. **Manisuris granularis** Sw. Prodr. Veg. Ind. Occ. (1788) 25.

Stems 10-75 cm. high, slender, compressed, softly hairy, leafy; nodes hairy. Leaves 3.8-20 cm. by 6-13 mm., linear-lanceolate, acute or acuminate, flat, hairy on both surfaces or on the lower only with bulbous-based hairs, margins ciliate, base cordate; sheaths much shorter than the internodes, hispid with bulbous-based hairs; ligule very short, membranous, densely ciliate. Racemes 0.6-2.5 cm. long, resembling a string of minute beads, solitary or seemingly fascicled in the axils of the leaves, but individually from shortened axillary branches. Sessile spikelets 1.6-2 mm. long, subglobose; callus tumid, glabrous. Glumes 4; lower involucral glume irregularly foveolate on the back; upper involucral glume closing the cavity of the lower floral glume, elliptic-oblong, obtuse, 1-nerved; lower floral glume hyaline, shorter than the upper involucral glume; upper floral glume about equalling the lower, broadly ovate, obtuse; palea similar but a little shorter. Pedicellate spikelets equal in length to the sessile or longer, of 2 equal green glumes about 2.5 mm. long; lower involucral glume broadly ovate or suborbicular, obtuse or subacute, 5-7-nerved, one margin narrowly folded, the other with a hyaline wing; upper involucral glume boat-shaped, laterally compressed, the keel with a dorsal hyaline ciliolate wing.

Distribution: Throughout the hotter parts of India, Ceylon.—Most tropical countries.

In Behar, it is prescribed internally in conjunction with a little sweet oil, in cases of enlarged spleen and liver (Ainslie).

Ajmere: Kangni—; *Berar:* Ratop—; *Chanda:* Agimaligadi—; *Gujerati:* Kasiun, Kasiunghas—; *Hindi:* Kangni, Trınpali—; *Rajputana:* Dhaturoghas—; *Sanskrit:* Palanggini—; *Udaipur:* Dhaturoghas—.

Vetiveria Thouars.

Coarse, perennial, glabrous grasses; rhizomes stout; culms stout, more or less compressed below. Leaf-blades firm to hard, conduplicate in bud, then flattening out, at least upwards, gradually passing into the sheath; lower sheaths much compressed, flabellate-imbricate. Panicles erect, long, of many-rayed whorls of slender simple or rarely compound racemes, glabrous except for the frequently bearded calli. Spikelets 2-nate, of each pair subsimilar, differing in sex, one sessile, the other pedicelled, on the articulate fragile rhachis of copiously whorled (rarely panicled) peduncled 3- to many- jointed racemes, the sessile spikelets falling with the contiguous joint and the accompanying pedicelled spikelet or at least the accompanying pedicel;

joints and pedicels slender, slightly and gradually thickened upwards. Florets 2, lower reduced to an empty glume, upper hermaphrodite in the sessile, male in the pedicelled spikelets. Sessile spikelet laterally slightly compressed, awned or awnless. Involucral glumes equal, lower more or less coriaceous or chartaceous with a broad rounded back and subinflexed margins, usually muticous, upper boat-shaped, keeled upwards, with broad hyaline ciliate margins, muticous, mucronate or aristulate. Floral glumes hyaline, of lower floret 2-nerved, of upper minutely 2-dentate, muticous or mucronulate or with a perfect or imperfect awn from the sinus. Pale minute, hyaline, nerveless. Lodicules 2 glabrous. Stamens 3. Stigmas laterally exserted; styles subterminal. Grain oblong, slightly oblique at top. Pedicelled spikelet dorsally compressed; involucral glumes much thinner than in the sessile, like the floral glumes usually awnless. —Species about 7.—Tropics of the Old World.

V. zizanioides Stapf is used medicinally in Guinea, La Reunion, and Guiana.

1. **Vetiveria zizanioides** Stapf in Kew Bull. (1906) 346-349, 362.—*Andropogon muricatus* Retz. Obs. III, 43.—*A. squarrosus* Cooke. (non Linn. f) Fl. Bomb. Pres. II, 991.—Plate 1015B (under *Andropogon squarrosus*).

A densely tufted perennial grass. Rootstock branching with spongy aromatic roots. Culms stout, up to over 1.8 m. high, usually sheathed all along. Leaf-sheaths compressed, especially the lower which are sharply keeled and fan-like, imbricate, very smooth, firm; ligules reduced to a scarious rim; blades narrowly linear, acute, 30-90 cm. long, 4.2-10.6 mm. wide, erect, rigid, firm or somewhat spongy, usually glabrous, rarely more or less hairy downwards on the face, pale green, midrib slender, lateral nerves close, 6 or more on each side, rather stout slightly prominent, margin spinously rough. Panicle oblong, up to over 30 cm. long, usually contracted; rhachis stout, smooth; whorls 6-10 with up to 20 rays; branches oblique to suberect, naked for up to 5 cm., filiform, slightly rough. Racemes up to 5 (rarely 7.5) cm. long, very slender; joints about as long as the sessile spikelets or sometimes distinctly exceeding them, smooth or more or less rough, minutely and unequally ciliolate at the slightly oblique tips; pedicels similar, but shorter. Sessile spikelet linear-lanceolate to almost linear, acute or subacute, 4.2-4.8 mm. long, yellowish, olive or violet-brown or purplish to almost black; callus obtuse, under 1 mm. long, glabrous. Involucral glumes, acute, coriaceous, lower muriculate all over the back, 5-nerved, lateral nerves close, very fine; upper spinulously muricate on the keel. Lower floral glume as long as the involucral glumes, acute, reversedly ciliolate, upper up to 3.3 mm. long, narrow, oblong-lanceolate, mucronulate, ciliate. Lodicules 2, quadrate and conspicuous, though small. Styles and stigmas short. Stigmas purple. Anthers 2-3.3 mm. long. Pedicelled spikelet sparingly aculeolate or almost smooth; upper floral glume entire, acute.

Distribution: Practically over the whole of India and eastwards to Burma.—Throughout the Malay region, Lower Guinea, W. Indies, Brazil.

The root is cooling, bitter; alexiteric, stomachic, astringent; useful in burning sensations, bilious fevers, sweats, foul breath, thirst, strangury, ulcers, diseases of the blood (Ayurveda).

The root is cooling to the brain; bitter, soporific; useful in spermatorrhœa, headache, diseases of the blood (Yunani).

An infusion of the root is given as a febrifuge, and a powder in bilious complaints. It is regarded as stimulant, diaphoretic, stomachic and refrigerant. The essence (or otto) is used as a tonic. A paste of the pulverised roots in water is also used as a cooling external application in fevers.

In Guinea, the infusion of the roots is used as a tonic and an emmenagogue.

Neither the root nor the stem is an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

The essential oil from the roots has been examined chemically by Sanjiva Rao, Sudborough, and Watson (*Journ. Ind. Inst. Sc.* VIII (A), 1925).

Arabic: Izkhir, Usir—; *Bengal:* Khaskhas—; *Bombay:* Khasakhasa, Vala—; *Burma:* Miyamoe—; *Canarese:* Lavancha—; *Cutch:* Vala—; *Deccan:* Khaskhas—; *English:* Cuscus, Khuskhus, Koosa—; *French:* Chiendent des Indes, Vetiver—; *Gujerati:* Valo—; *Hindi:* Bala, Balah, Bena, Ganrar, Khas, Onei, Panni—; *La Reunion:* Vetiver—; *Malayalam:* Ramachehamver, Vettiver—; *Marathi:* Vala—; *Mundari:* Birnijono, Sirum, Sirumjono—; *Oudh:* Tin—; *Persian:* Bikhiwala, Khas—; *Philippines:* Moro—; *Punjab:* Panni—; *Sadani:* Birni—; *Sanskrit:* Abhaya, Amrinala, Avadaha, Dahaharana, Gandhadhya, Haripriya, Indragupta, Ishtakapatha, Jalamoda, Jalashaya, Jalavasa, Rambhu, Katayana, Laghubhaya, Lamajjaka, Nalada, Ranapriya, Samagandhika, Sevya, Shishira Shitamulaka, Sugandhimula, Ushira, Vira, Virabhadra, Virana, Virataru, Vitanamulaka—; *Santali:* Sirom—; *Sinhalese:* Saivandera, Savandramul—; *Tamil:* Ilamichamver, Vettiver, Vilhalver, Viranam—; *Telugu:* Avurugaddiveru, Lamajjakamuveru, Vattiveru, Vidavaliveru—; *Urdu:* Khas—.

AMPHILOPHIS Nash.

Perennial grasses. Stems slender, simple or branched, bearded or beardless at the nodes. Panicles mostly subdigitate with a short primary axis, rarely the racemes on branches of the second order; racemes always shortly peduncled. Spikelets small, 2-nate, one sessile, the other pedicelled, similar in shape or the pedicelled reduced and smaller, the latter always different in sex except sometimes the lowermost pair which may be homogamous (male or neuter), on the fragile rhachis of many-jointed shortly peduncled racemes; joints and pedicels filiform, longitudinally grooved and hyaline in the groove disarticulating horizontally; sessile and pedicelled (always ?) spikelets deciduous, the former with the adjacent joint and pedicel. Florets 2 in the sessile spikelets, lower reduced to an empty glume, upper hermaphrodite, 2 or 1 in the pedicelled spikelet, the lower male or neuter, the upper neuter or usually quite suppressed. Sessile spikelet dorsally compressed, awned; callus small, shortly bearded. Involucral glumes equal, thinly chartaceous to membranous; lower 2-keeled, with narrow sharply inflexed margins; upper boat-shaped, 3-nerved, acutely keeled. Lower floral glume hyaline, nerveless, upper a hyaline linear stipe, firmer upwards, passing into a slender awn. Pales 0 or very minute. Lodicules 2, minute, glabrous. Stamens 3. Stigmas exserted laterally usually low down, longer than the styles. Grain oblong, obtuse, dorsally slightly compressed; embryo about half the length of the grain. Pedicelled spikelet awnless, glumes, if present, hyaline, nerveless.—Species probably over 25.—Mostly in tropical Asia.

The genus is therapeutically inert.

1. **Amphilophis odorata** A. Camus Rev. Bot. appl. et d'Agric. Colon. I (1921) 305.—*Andropogon odoratus* Dna. Lisboa in Journ. Bom. Nat. Hist. Soc. IV (1889) 123 cum ic. and VI (1891), 68, 203.

Aromatic; stem erect, 0.9-1.2 m. high, as thick as a swan's quill at the base, sometimes branching below, leafy; nodes bearded. Leaves 30-60 cm. by 4-10 mm., linear-lanceolate, flat, acuminate, scaberulous on both surfaces and on the margins, bright green, with strong nerves; sheaths long, glabrous, smooth, compressed, the upper sheathing the base of the inflorescence; ligule small, membranous, truncate. Racemes numerous, purplish, silky, suberect, slender, flexuous, densely fascicled, pedicellate, crowded at the end of a long peduncle and forming a dense panicle 5-10 cm. long; joints and pedicels flattened, with a translucent centre, silky-hairy, the joints 1.6 mm. long, the pedicels rather longer. Sessile spikelets purplish, 4 mm. long, oblong-lanceolate, acute; callus small, bearded with silky hairs; lower involucral glume thin, oblong-lanceolate, truncate, 7-nerved, softly hairy below the middle, rarely pitted; upper involucral glume very little longer than the lower and broader, thinly membranous, keeled; lower floral glume hyaline, oblong-lanceolate, shorter than the upper involucral glume, nerveless, awn 13-16 mm. long, slightly dilated towards the base. Pedicellate spikelets as long as or slightly longer than the sessile; lower involucral glume narrow, many-nerved, dorsally glabrous; upper involucral glume 3-nerved, ciliate; lower floral glume shorter, oblong, obtuse, nerveless.

Distribution: W. Peninsula.

The plant is considered carminative.
Bombay: Ushadhana—.

CYMBOPOGON Spreng.

Perennial, densely tufted and usually aromatic grasses. Leaves often very coarse. Panicles frequently much compound and contracted, spatheate. Spikelets 2-nate, those of each pair differing in sex and more or less in shape—except those of lowest pair of the lower or of both racemes which are homogamous (male or neuter)—one sessile, the other pedicelled on the articulate fragile rhachis of many-jointed paired racemes, terminating the culms and their branches; raceme-pairs supported by a spatheole, collected into often decompound or supra-decompound spatheate panicle; the fertile spikelets falling with the contiguous joint and the accompanying pedicel; joints and pedicels filiform or linear with frequently more or less cupular or auricled tips, those of the lowest pair (raceme-base) often conspicuously swollen, oblong or barrel-shaped and hard. Sessile spikelets (abo~~ve~~ the lowest) female or hermaphrodite, dorsally, rarely, laterally, compressed, awned (normally); callus very short, obtuse, shortly bearded. Involucral glumes equal or subequal, more or less chartaceous, lower almost flat or slightly depressed or narrowly grooved on the back, with at least from the middle upwards sharply inflexed margins, 2-keeled, upper more or less boat-shaped, keeled upwards, usually 1-nerved. Floral glumes ciliate or ciliolate (sometimes obscurely), lower entire, hyaline, 2-nerved, upper 2-fid or 2-lobed, hyaline, rarely firmer and almost stipe-like below the insertion of the awn; column of awn, if any, smooth. Pale 0. Lodicules 2, minute, glabrous. Stamens 3, Stigmas laterally exserted; styles terminal. Grain oblong in outline, subterete to plano-convex in cross-section; embryo about half the length of the grain. Pedicelled spikelets usually slightly different in shape and size from the sessile, but never depressed or grooved on the back. Involucral glumes muticous, lower chartaceous to subchartaceous upper thinner. Lower floral glume hyaline 2-nerved, upper 0, but usually a male flower present.—Species about 36.—In the tropical and subtropical regions of the Old World.

A. Basal leaf-sheaths in dense tufts, tightly clasping, thickened below; blades more or less filiform and flexuous, except when very short; racemefascicles more or less simple .... 2. *C. schoenanthus.*

B. Basal leaf-sheaths ultimately loosened and curled; blades flat; raceme-fascicles compound .... 1. *C. jwarancusa.*

C Sessile spikelets lanceolate or ovate- or obovate- lanceolate; back flat. Lowest pedicel of raceme scarcely stouter than the upper

All the spikelets awnless .... 3. *C. nardus*

D. Sessile spikelets linear to lanceolate-linear, awnless; back distinctly concave in the lower part; panicle usually loose; branches slender, the ultimate branchlets more or less nodding; spathes long and narrow; hairs of joints and pedicels rather spreading .... 4. *C. citratus.*

Stimulant, diuretic, diaphoretic, and emmenagogue.

C. schoenanthus Spreng. is used medicinally in China, Guinea, Madagascar and Guiana; *C. nardus* Linn. in Combodia, Guinea, and Madagascar; *C. citratus* Stapf. in the Gold Coast; *C. excavatus* Stapf., *C. marginatus* Stapf., *C. validus* Stapf. in South Africa.

C. Winterianus Jowitt is officinal in Germany.

1. **Cymbopogon jwarancusa** Schult. Mantiss. II (1824) 458. —*A. Jawarancusa* Jones in As. Res. IV (1795) 109.

Usually a tall grass, up to 1.8 m. high, with very aromatic roots, densely tufted, the stems from clusters of firm, persistent, finally loose and open and tortuous leaf-sheaths, more or less widened below. Leaves flat, up to 60 cm. long and 5 mm. broad, narrowly linear, filiform above and ending in a long capillary tip, ligule 0.5 mm. long, membranous. Panicles long, narrow interrupted, with very compressed, short, fascicled branches bearing spathes about 5 cm. long and spatheoles 6-18 mm. long. Racemes 1.4-1.8 cm. long, often 5-jointed, joints half as long as the uppermost villi. Spikelets 3-4 pairs, green half hidden by the 5 mm. long villi on the joints and pedicels. Sessile spikelets 5 mm. long; lower involucral glume flat or concave between the keels, which are neither winged nor margined (omitting of course, the ordinary inflexed margins of the glume common to the genus) or sometimes narrowly margined, scabrid or ciliolate, nerves 2-4 or 0 between the keels. Joints of rhachis and pedicels subclavate, with toothed tips. Pedicelled spikelets equal or rather longer than the sessile, narrowly lanceolate, purplish; lower involucral glume 7-9-nerved.

Distribution: Outer hill zone of the United Provinces, Kumaon, Garhwal and westwards as far as Peshawar, Jodhpur and Jaisalmer, Sind, Bihar.

The grass is cooling, bitter; digestible, alexiteric; appetiser, stomachic, astringent; useful in diseases of the blood and the skin, sweats, strangury, burning sensations, leprosy, "tridosha," biliousness, thirst, vomiting, unconsciousness, fever (Ayurveda).

The grass is hot and dry; diuretic, lithontriptic, emmenagogue, carminative; applied to abdominal tumours.—The flowers are styptic (Yunani).

It is used to purify the blood, and in coughs, chronic rheumatism and cholera. It is recommended as a valuable aromatic tonic in dyspepsia, especially that of children; it is also used as a stimulant and diaphoretic, in gout, rheumatism and fever.

Arabic: Izkhir—; *Bengal:* Gandhavena, Ibharankusha, Karankusa—; *Bombay:* Izkhir—; *Canarese:* Karilavancha—; *Gujerati:* Jalavalo, Khadajala, Pilovalo—; *Hindi:* Bur, Ghatyari, Ibharankusha, Karankusha, Khavi, Khawi, Khoi, Lamjak, Panni, San, Solara—; *Marathi:* Izkir, Lavaja, Pivalavala—; *North-West Provinces:* Bad, Ganguli, Misiyaban, Piriya—; *Persian:* Gurgiyah—; *Punjab:* Bur, Ghatyari, Ibharankusha, Karankusha, Khavi, Khawi, Khoi, Lamjak, Panni, San, Solara—; *Sanskrit:* Amrinala, Avadahaka, Avadataka, Dirghamula, Ishthakapathika, Jalashaya, Laghu, Lamajjaka, Laya, Nalada, Sevya, Shighra, Sunala, Sunila—.

2. **Cymbopogon schoenanthus** Spreng. Pug. II (1815) 15. (non Schult).—*Andropogon schoenanthus* Linn. Sp. Pl. (1753) 1046. —*A. laniger* Desf. Fl. Atlant. II (1800) 379.—PLATE 1015A (under *Andropogon schoenanthus*), and PLATE 1016 (under *A. laniger*).

Perennial, compactly caespitose, with numerous intravaginal innovations, 15-45 cm. high. Culms erect, slender, few-to 4-noded and simple below the inflorescence, terete, glabrous, very rarely with a few small hairs at the nodes. Leaf-blades semiterete, filiform, wiry, flexuous, very firm and often circinate upwards, rounded on the back, channelled on the face or those of the culms somewhat flatter and shorter, up to more than 23 cm. long, 1 mm. in diam., glabrous, finely scaberulous on the nerves below, though often smooth to the touch, pale, glaucous, evenly 7-9-nerved, the midrib showing only above as a broad, white band. Ligules membranous to scarious, oblong, truncate, ciliate, up to 3.3 mm. long. Sheaths very firm, smooth, glabrous, tight, those of the innovations and base of the culms widened at the base, very tough and long-persistent, straw-coloured, up to 13 cm. long. Spatheate panicle narrow, 8-30 cm. long, few- to 7- noded, lower internodes 5-7.5 cm. long, upper rapidly decreasing in length, slender, glabrous; lowest primary branch rarely undivided at the base, 3-2-noded and up to 15 cm. long, usually forming up to 4-rayed tiers; lowest subtending sheaths with foliaceous blades; rays finely filiform, 2.5-3.7 cm. long, rarely to over 5 cm., glabrous; spathes narrowly lanceolate, subherbaceous, often tinged with pale purple, with a short blade or the upper bladeless and produced into a setaceous point, 3.7-4.3 cm. long, glabrous. Spatheoles very narrow, acute or with a setaceous point, 12-25 mm. long, pale or straw-coloured; peduncles finely filiform, widened upwards 3.3-4.2 mm. long, tips truncate. Racemes 2-nate, more or less divaricate, at length epinastically deflexed, 1-2 mm. long, white-villous, pale or tinged with purple, one subsessile, the other with a bare base, 1-2 mm. long, bases puberulous to pubescent in the fork, ciliate-bearded upwards, with minutely cupular and denticulate tips, that of the subsessile raceme as well as the adjacent pedicel stout, elliptic to elliptic-oblong in outline and convex on the back, ultimately more or less glabrescent and glossy; fertile joints filiform, slightly widened towards the oblique subcupular auricled tips, 2.7-3.3 mm. long, densely hairy to villous from the back and the angles; adjacent pedicels similar to the joints but more slender. Homogamous pair of spikelets one at the base of the sessile or of both racemes; the sessile spikelet of the lowest but one of the sessile raceme intermediate and imperfectly awned. Fertile spikelets linear-lanceolate, more or less acuminate, acute, including the callus 5.3-6.3 or even 7.4 mm. long, glabrous, pale green below, reddish upwards; callus short obtuse, shortly bearded. Involucral glumes equal, chartaceous, lower nerveless and shallowly concave between the acute scabefulous keels, minutely 2-denticulate, upper lanceolate-oblong in profile, acute slightly curved on the back 1-nerved, margins broadly hyaline upwards, ciliate. Lower floral glume linear-oblong nerveless, hyaline, ciliolate, slightly shorter than the involucral glumes, upper very narrow, shortly 2-fid, cuneate-linear and chartaceous below the insertion of the awn, less than 3.3 mm. long, lobes broadly lanceolate, ciliate, awn up to 1 cm. long, very fine, more or less keeled at and slightly twisted below the middle; column smooth. Anthers 2 mm. long. Pedicelled spikelets male, linear-oblong, 4.2-6.3 mm. long, glabrous, more reddish than the sessile; involucral glumes sub-chartaceous, with 5-9 evenly distant intracarinal nerves, the upper thinner, 3-nerved; lower floral glume liner-oblong, sub-2-nerved, ciliolate, 4.2 mm. long; upper floret reduced to a male flower, or its glume present as a microscopic scale.

Distribution: Punjab, Sind, Baluchistan.—Afghanistan through N. Africa to Morocco.

The grass is acrid, bitter, pungent; useful in fevers, bronchitis, pains, leprosy, heart diseases, throat troubles, epileptic fits in children (Ayurveda).

The oil is applied in rheumatism and neuralgia.

The decoction of the grass is said to be a febrifuge.

Both the root and the stem are useless in the antidotal treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Bengal: Agyaghas, Gandhabena, Ramakarpura—; *Bicol:* Baliyoc—; *Bombay:* Rohisha, Rosegavat—; *Canarese:* Vasanchullu—; *Ceylon:* Camel Grass—; *Chinese:* Mao Hsiang—; *English:* Geranium Grass—; *French:* Barbeau musqué, Chiendent musqué, Foin de chameau, Gramen oriental, Jonc odorant, Pature de chameau, Schoenanthe, Schoenanthe odorant—; *French Guiana:* Citromelle—; *Fort Sandeman:* Sargarh—; *Gujarat:* Roshdo, Roshghas, Rush, Rushghas—; *Hassan:* Ezkryr—; *Hindi:* Bujina, Mirchiagand, Musel, Palakhari, Rohisha, Rousaghas, Rusaghas, Saundhiya—; *Hova:* Fiahana, Fiahina, Fiehana, Verofehana, Veromanitra—; *Italian:* Fieno di camelo—; *Jhalawan:* Hawai—; *La Reunion:* Citronnelle—; *Las Bela:* Pui—; *Marathi:* Rohisha, Rosegavat, Rushagavat—; *New Caledonia:* N'Dowi—; *North-West Provinces:* Bujina, Palakhari—; *Philippines:* Paja de meca, Raiz de moras, Salaid—; *Punjab:* Ranus, Rauns—; *Saharanpur:* Mirchagandh—; *Sanskrit:* Bhuti, Bhutika, Devajagdha, Dhupagandhika, Dhyama, Dhyamaka, Katrina, Paura, Putimugdala, Rohisha, Rohishatrina, Saugandhika, Shyamaka, Sugandhatrinashita, Sushitala—; *Shahrig:* Sargarah—; *Siwaliks:* Mirchiagard—; *Spanish:* Esquenanto, Paja de camello, Paja de la Meca—; *Tagalog:* Salai, Salay, Tanglad—; *Visayan:* Tanglad—.

3. **Cymbopogon nardus** Linn. (non Rendle).—*Andropogon nardus* Linn. Sp. Pl. 1046—Plate 1017 (under *Andropogon nardus* Linn).

A tall grass 1.5-2.1 m. high copiously branched above and forming a large decompound nodding panicle. Culms up to 10 mm. diam. at the base, solid, pale polished, with black finely pubescent or glabrescent nodes. Leaves narrow with conspicuous white midrib, lower about 15 mm. wide, upper cauline rarely over 9 mm. wide, narrowed to the base, apex filiform, glaucous beneath, glabrous except sometimes at top of sheath, with scabrous margins; ligule scarious, 2-2.5 mm. long, glabrous or ciliate. Panicle ultimate branches strict with 2-3 peduncles and spathules from each spathe. Spathules 10 mm. to about 2.5 mm., peduncles of spatheoles filiform 13-18 mm. very shortly exserted from the spathe; spikes soon strongly reflexed on their common 10 mm. long peduncle, base swollen ciliate. Spikes 10-13 mm. long unequally pedicelled, joints and pedicels rather slender 2-2.25 mm. not clavate (tip only dilated and toothed), villous. Sessile spikelet not tightly squeezed between joint and pedicel nor covered by their hairs, 4-5 mm. long, glume 1 oblong-lanceolate flat or slightly concave below, hyaline and nerveless or with 2 green nerves between the keels which are not or very narrowly winged above the middle, scabrous and slightly excurrent, proper margins inflexed throughout.

Distribution: Throughout the hotter parts of India, Burma, Malay Peninsula, Ceylon. —Tropical Asia, Africa, Australia.

The infusion of the leaves is used as a stomachic and carminative.

The oil is stimulant, carminative, antispasmodic and diaphoretic. It is used as a rubefacient.

In Cambodia, the flowers are considered bechic and diaphoretic; the roots diuretic, sudorific, antiperiodic.

Bengal: Kamakher—; *Burma:* Singoumia—; *Cambodia:* Sakrey, Slekrey—; *Canarese:* Gandahanchikhaddi, Kamakshihullu—; *Deccan:* Ganjni—; *English:* Çitronella Grass—; *Hindi:* Ganjni, Ganjnikaghas, Pustburn—; *Hova:* Verofehana—; *Malayalam:* Chorapulla, Kamakshipulla—; *Marathi:* Ganjni, Usadhana—; *Sinhalese:* Maana, Pengirimana—; *Spanish:* Espicanardo espurio—; *Tamil:* Kavattampillu, Kamachipillu, Mandappillu, Sunnarippillu—; *Telugu:* Kamakshikasuvu, Kamanchigaddi—; *Zulu:* uQungu—.

4. **Cymbopogon citratus** Stapf. in Kew Bull. (1906) 357.—*A. citratus* DC. Cat. Hort. Monsp. (1813) 78.—PLATE 1018 (under *Andropogon citratus* DC.).

A tall perennial, throwing up dense fascicles of leaves from a short, oblique annulate, sparingly branched rhizome, usually barren, but occasionally giving rise to a stout erect culm up to over 1.8 m. high, 7-8-noded and simple below the panicle. Leaf-blades linear, long-attenuated towards the base and tapering upwards to a long setaceous point, up to over 90 cm. long by 16-18 mm. wide, very firm, glaucous green, glabrous, smooth or more or less rough upwards and along the margins; midrib somewhat stout below, whitish on the upper side; primary lateral nerves 4-6 on each side, raised particularly above with 2-4 secondary nerves between them. Ligules very short, scarious, rounded or truncate. Sheaths terete, those of the barren shoots much widened at the base, and tightly clasping each other, narrow and separating upwards, with rounded shoulders at the mouth, 10-30 cm. long, subcoriaceous, quite glabrous and smooth, more or less cinnamon-coloured or russet on the inside; sheath of the culms tight, shorter than the internodes, finely pubescent or velvety at the nodes. Spatheate panicle decompound to subdecompound, loose, 30 to over 60 cm. long, nodding; internodes 4 to over 6, the longest up to 20 or 22 cm. long, rapidly decreasing in length upwards; lowest primary branches undivided at the base, up to over 45 cm. long, and up to 5- or 6- noded, the following forming mixed tiers of very unequal variously compound and simple rays, ultimate tiers up to 4-rayed; rays filiform and glabrous; spathes narrow-lanceolate, acute or acuminate, 2.5-5 cm. long with narrow membranous margins.

Spatheoles very narrow, linear-lanceolate to almost subulate when inrolled, 14-18 mm. long; acute or finely acuminate, reddish to rich russet. Peduncles 6-10 mm. long, glabrous. Racemes 2-nate, finally spreading at right angles or epinastically deflexed, moderately dense, 14-25 mm. long, pale, variously tinged with dull purple, loosely villous, one subsessile the other with a slender filiform bare base, almost 2 mm. long and hairy, the pedicel of the homogamous pair also slender, though short; fertile joints filiform, slender, 2-3 mm. long, ciliate on both sides, tips obliquely auriculate and cupular, adjacent pedicels very similar. Homogamous pair of spikelets 1 at the base of the sessile raceme, its sessile member usually slightly differing in shape from the fertile spikelets. Fertile spikelets linear to linear-lanceolate, acutely acuminate, 5-6 mm. long, reddish, glabrous; callus short, obtuse, minutely bearded. Involucral glumes subequal, lower subchartaceous, slightly depressed towards the base, otherwise flat on the back, keels acute, scaberulous above, intracarinal nerves 0 or 1, short or indistinct, upper boat-shaped, slightly curved on the back, acute, keeled upwards. Lower floral glume hyaline, linear-oblong or almost linear, sub-2-nerved, ciliolate above, slightly shorter than the involucral glumes, upper narrowly linear, acute, about 4 mm. long, usually entire and awnless, rarely more or less 2-fid with a small bristle from the sinus. Anthers 2 mm. long. Pedicelled spikelets male or neuter, linear to subulate-lanceolate, as long as the sessile, reddish, glabrous; lower involucral glume 5-9-nerved, upper 3-nerved; lower floral glume shorter to much shorter than the involucral glumes, hyaline, ciliolate upper very narrowly linear, nerveless if present at all.

Distribution: Only known in the cultivated state. Probably of Indian origin and now widely distributed over the tropics of both hemispheres.

The grass is pungent, bitter, sharp, hot; laxative, appetiser, alexipharmac, anaphrodisiac, anthelmintic; useful in bronchitis, leprosy, epileptic fits; causes burning sensation (Ayurveda).

In flatulent and spasmodic affections of the bowels, and in gastric irritability, the oil is a remedy of value.

In cholera it proves serviceable, not only by allaying and arresting the vomiting, but by aiding the process of reaction. Externally applied, it forms an excellent embrocation in chronic rheumatism, neuralgia, sprains and other painful affections.

In the Gold Coast, the leaves are often boiled in water like tea and the liquor is drunk to cure fever. It is sometimes put into hot bath water and the patient stands in the hot vapour given off. This is also said to be a good cure for fever.

Bengal: Gandhabena—; *Canarese:* Majjigehullu, Purhalihulla—; *Deccan:* Hazarmasalah—; *English:* Lemon Grass, Melissa Grass—; *French:* Chiendent citronnelle—; *Gujerati:* Lilacha, Lilicha—; *Hindi:* Gandhatrina—; *Java:* Sireh—; *Malaya:* Sereh—; *Malayalam:* Shambharapulla, Vasanappula—; *Marathi:* Hirvacha, Olancha—; *Persian:* Chaekashmiri, Hazarmasalah—; *Sanskrit:* Abichhatraka, Atigandha, Badhira, Badhiradhvanibodhana, Bhustrina, Bhutika, Bhutina, Chhatra, Gochhalaka, Guchhala, Guhyabija, Gundardha, Jambukapriya, Karenduka, Kutimbaka, Malatrinaka, Punsvavighraha, Putigandha, Rohisha, Samalambi, Shringaroha, Sugandha—; *Sinhalese:* Penquin, Saira—; *Tamil:* Karpurappillu, Vasanappillu—; *Telugu:* Chippagaddi, Nimmagaddi—.

HETEROPOGON Pers.

Perennial or annual grasses, with simple or more often upwards branched culms; branches few to many, mostly flowering and gathered into a spatheate panicle; racemes conspicuously dorsiventral, the bases of the male (or neuter) spikelets subimbricate on the back of the raceme, their upper parts bending forward around the sides, forming a hollow in which the fertile spikelets are enclosed, with their awns exserted anticously and often intertwisted. Spikelets 2-nate, those of the lower (1 to many) pairs alike in sex and shape, male or neuter of the upper pairs differing in sex and shape, one of each pair sessile, the other pedicelled on the many-jointed rhachis of solitary racemes, terminating the culms and their upper branches; rhachis tough or upwards tardily disarticulating and glabrous between the homogamous pairs, readily disarticulating above them; homogamous pairs long-persistent, the spikelets of the heterogamous pairs falling separately, the pedicelled with the pedicel, the sessile with the adjacent joint and the adjacent pedicel or its base. Sessile spikelets subcylindric, awned; callus long, pungent, densely bearded upwards. Involucral glumes equal, the lower coriaceous rarely chartaceous, more or less tightly involute, quite keelless, nerves obscure, often connected by few transverse nerves in the upper part; upper with a deep longitudinal groove on each side, coriaceous, rarely chartaceous between them, thinner towards the margins, membranous at the tips, 3-nerved. Lower floral glume hyaline, nerveless, upper stipitiform from a hyaline very slender base, cartilaginous upwards and passing into a usually stout geniculate awn. Pale small or absent. Lodicules large or more or less reduced, to very minute. Stamens 3, often rudimentary or absent, stigmas exserted terminally or laterally. Grain more or less linear in outline, subterete, slightly dorsally compressed; embryo somewhat exceeding the middle of the grain. Pedicelled spikelets male or neuter, dorsally flattened, usually slightly asymmetric, and often somewhat twisted, muticous, imbricate. Lower involucral glume herbaceous, many-nerved, winged upwards from one or both keels; upper membranous, lanceolate-oblong, acute, 3-nerved. Floral glumes hyaline, 1-nerved well-developed or more or less reduced. Stamens 3 or 0.—Species about 6.—Tropical and subtropical regions of the whole world.

H. contortus Roem. and Schult. is used medicinally in China.

1. **Heteropogon contortus** Roem. & Schult. Syst. Veg. II, 836.—*Andropogon contortus* Linn. Sp. Pl. (1753) 1045.

Perennial; stems 30-150 cm. long, densely tufted, erect or decumbent below, slender, leafy chiefly at the base, simple or subfastigiately branched, compressed towards the base. Leaves 15-30 cm. by 2.5-5 mm. linear, often shortly and abruptly- (rarely long-) acuminate, flat, suberect, rigid, often sparingly ciliate towards the base, sometimes with scattered bulbous-based hairs above, scaberulous below; sheaths compressed, keeled, glabrous, the mouth shortly auricled; ligule short, truncate, ciliolate. Racemes 3.8-7.5 cm. long; internodes very short, the lower inarticulate; spikelets closely imbricating, subsecund, the lower 2-6 or more sessile, awnless, male or neuter, the upper sessile spikelets narrow, long-awned, female. Sessile (female) spikelets 6 mm. long; callus long, acute, pungent, bearded with reddish brown hairs; lower involucral glume linear-oblong, truncate, dark brown, many-nerved, hispidulous, margins strongly incurved (not winged), tip membranous; upper involucral glume linear, obtuse, concave, rigidly coriaceous, dark brown, hispidulous; lower floral glume short, oblong, truncate, nerveless; upper floral glume represented by the subulate white base of a hirsute awn which reaches 7.5 cm. or more long. Pedicellate spikelets much longer than the sessile (8-13 mm. long); pedicel very short; lower involucral glume lanceolate, usually obliquely twisted, herbaceous, dorsally hispid with long bulbous-based hairs, the margins more or less (often unequally) winged, the wings serrulate; upper involucral glume oblong-lanceolate, acuminate, 5-nerved, margins hayline; lower floral glume oblong, 1-nerved; upper floral glume obovate-oblong, ciliate, nerveless. Lower sessile spikelets like the pedicellate, more or less covered with bulbous-based hairs.

Distribution: Mediterranean region, and tropics and subtropics generally.

The root is stimulant and diuretic.

Afrikaans: Steek Gras—; *Chinese:* Ti Chin—; *English:* Spear Grass—; *Ga:* Akorsorfong, Ananugangi—; *Gujarat:* Dabhjuliyun—; *Hindi:* Sarol, Shurighas, Shurval—; *Kohlu:* Barwuz—; *Marathi:* Gantegawta, Kantegawta—; *Ormara:* Abdarka—; *Sesuto:* Selokana—; *Shahrig:* Barwaz—; *Zulu:* isiTupe—.

AVENA Linn.

Annual or perennial herbs, low or moderately tall. Panicles narrow or open, usually rather few-flowered of usually large spikelets. Spikelets 2-several-flowered; rhachilla bearded, disarticulating above the involucral glumes and between the flowering glumes. Involucral glumes about equal, membranous or papery, several-nerved, longer than the lower floret, usually exceeding the upper floret. Floral glumes indurate, except towards the summit, 5-9-nerved bidentate at the apex, bearing a dorsal bent and twisted awn, which is straight and reduced in Avena sativa.—Species about 55.—Chiefly temperate regions.

1. Ligule short, very obtuse, up to 3 mm. long ....1. *A. fatua.*
2. Ligule truncate 1·3 mm. long .... 2. *A. sativa.*

Seeds emollient, cooling, and diuretic.

A. fatua Linn., *A. sativa* Linn., *A. sativa* var. *orientalis* Hook. f. are used medicinally in Europe; *A. fatua* Linn. is also used in China.

The seeds of *A. agraria* Brot. var. *mutica* and *sesquialtera* Brot. (*A. strigosa* Schreber var. *elatior* Kunth) are officinal in Portugal.

1. **Avena fatua** Linn. Sp. Pl. (1753) 80.—Plate 1019.

Culms solitary or few in a tuft, with few or no barren shoots; leaf-sheaths glabrous or the lower more or less hairy; ligules short, very obtuse, up to 3 mm. long; blades linear to lanceolate-linear, up to 30 cm. by 12 mm., glabrous or rarely sparsely hairy, scabrid; panicle open or contracted; branches spreading equally all round or more or less erect and subsecund; spikelets 8 to 20 mm. long, with 2-3-awned flowers and with or without a rudimentary, usually minute, awnless flower above them; rhachilla freely disarticulating below and more or less so between the glumes, joints between the glumes villous; empty glumes broad-lanceolate, acuminate, 7-9-nerved; flowering glumes lanceolate, acute, shortly 2-4-toothed, the lowest 12-18 mm. long, usually brown below and green towards the tips, scaberulous, with stiff brown hairs to the middle or subglabrous with the exception of the very short callus, 7-nerved, all awned except the rudimentary uppermost; awn from the middle, scabrid, column very dark, 8-15 mm. long, bristle 1-3 mm. long; anthers 2-4 mm. long; ovary villous all over; grain 3-4 cm. long, tightly embraced, free, silky all over.

Distribution: Punjab, N.-W. Himalaya, Sikkim Himalaya.—Temperate Europe, N. Africa, N. Asia.

The seed is believed to produce poisonous and deleterious effect (Stewart).

In Europe, the seeds are used for their emollient, refrigerant, and diuretic properties.

Catalan: Cugula—; *Chinese:* Ch'iao Mai—; *English:* Drake, Flaver, Haver, Kentish Longtails, Poor Oats, Sowlers, Uncorn, Wild Aits, Wild Oat—; *French:* Aveneron, Averon, Avoine bouffe, Avron, Coquiolle, Couyonne, Folle avoine, Pied de mouche—; *German:* Windhafer—; *Hindi:* Gandal, Ganer, Jei, Kuljud—; *Italian:* Lippa—;

Jhalawan: Gandamkao—; *Languedoc:* Coughioulo—; *Punjab:* Ganerjei, Gozang, Kasamm, Upwa, Yupo—; *Roumanian:* Odos—; *Russian:* Jivoi ovios—; *Spanish:* Avena loca, Cula—.

2. **Avena sativa** Linn. Sp. Pl. 79.

An annual 30-90 cm. high with pendulous spikelets about 2.5 cm. long without the 13-18 mm. exserted awn. Glumes very long acuminate. Rhachilla tenacious or disarticulating below glume III. Ovary tip villous.

Distribution: Cultivated in N. India, from Bengal to the Indus in the Himalaya up to 12,000 ft.

The seeds are a nerve tonic, stimulant, and antispasmodic. Avena forms an important restorative in nervous prostration and exhaustion after all febrile diseases, and as a tonic in spermatorrhœa and insomnia. It seems to exert a very beneficial action upon the heart muscles and on the urinary organs, speedily relieving spasmodic conditions of bladder and ureter.

Catalan: Sibada—; *Dutch:* Haver—; *English:* Groats, Oat, Oats—; *French:* Avoine, Avoine cultivée, Avoine noire—; *German:* Haber, Hafer—; *Greek:* Bromi—; *Hova:* Varintsoavahy—; *Hungarian:* Zab—; *Italian:* Avena, Vena—; *Languedoc:* Arracho, Aveino, Civada, Civado, Sibado—; *Malta:* Oats, Avena, Hafur—; *Polish:* Owies—; *Portuguese:* Avea—; *Roumanian:* Ovez—; *Russian:* Ovios—; *Spanish:* Avena—.

Var. **orientalis** Hook. f. in Fl. Brit. Ind. VII, 275.

Bristly hairs at the base of glume III.

Distribution: N.-W. India.

The seeds are used in Spain as an emollient, refrigerant and diuretic.

DESMOSTACHYA Stapf.

Spikelets much compressed, imbricate, secund sessile and articulate on the very short densely crowded branchlets of a tall narrow racemiform panicle, acute and deciduous; rhachilla subarticulate.—Species 1.—India to Syria and N. Africa.

1. **Desmostachya bipinnata** Stapf. in Fl. Cap. VII, 632.—*Eragrostis cynosuroides* Beauv. Agrost. 71, 162.

Perennial, tall, branched from the base; rootstock stout, creeping; stolons very stout, covered with shining sheaths; stems 30-90 cm. high, tufted, smooth, erect, stout. Leaves many, the basal fascicled, reaching sometimes 50 cm. long and 1 cm. broad at the base, rigid, acuminate, with filiform tips and hispid margins; sheaths glabrous; ligule a hairy line. Panicle 15-45 by 1.3-3.8 cm., strict, erect, narrowly pyramidal or columnar, often interrupted; rhachis puberulous; branches many, short, scarcely reaching 2.5 cm. long, crowded, clothed from the base with sessile imbricating spikelets. Spikelets sessile, secund, 2-seriate and crowded, deflexed, pale brown, rather shining, 13 mm. long, up to 30-flowered; rhachilla tough. Involucral glumes very unequal; lower 0.5 mm. long; upper 1.6 mm. long, obtuse; floral glumes 1.6-2 mm. long, ovate, acute, coriaceous; palea shorter than its glume, subcoriaceous, with minutely scabrid keels. Stamens 3; anthers 0.8 mm. long. Grain 0.5-0.6 mm. long, obliquely ovoid, laterally compressed, obscurely 3-gonous.

Distribution: Throughout India in hot and dry places.—Nubia, Egypt, Syria.

The root is sweet, cooling; useful in thirst, asthma, jaundice, biliousness, diseases of the blood.—The plant is sweet, acrid; cooling, oleaginous; aphrodisiac, diuretic; useful in diseases of the blood, biliousness, asthma, thirst, strangury, jaundice, vaginal discharges, vesical calculi, diseases of the bladder, skin eruptions, vomiting; sedative to pregnant uterus; causes "kapha" (Ayurveda).

The culms are said to possess diuretic and stimulant properties. In the Konkan, they are prescribed in compound decoctions with more active drugs for the cure of dysentery, menorrhagia, etc.

Afghanistan: Drab, Kuthag—; *Bengal:* Kusha—; *Bolan:* Drab—; *Bombay:* Darbh—; *Bundelkhand:* Dabvi—; *Central Provinces:* Chir, Dabhat, Kusha—; *Gazechah:* Kuthag—; *Gujerati:* Dabha, Darabha—; *Hindi:* Dab, Davoli, Durva—; *Kani:* Kuthag—; *Kila Saifulla:* Sparmaghaz—; *Marathi:* Darbha—; *North-Western Provinces:* Dab, Daboi, Dhab, Kush—; *Punjab:* Dab, Dhab, Dib, Drab, Drabh, Kusa—; *Sanskrit:* Barhi, Darbha, Durbha, Garbha, Hrasva, Kurava, Kusha, Kutha, Kutupa, Pavitra, Suchyagra, Yajnabhushana—; *Shahrig:* Dab—; *Sibi:* Drab—; *Telugu:* Aswalayana, Dabha, Darbha, Durpa, Kusadarbha—; *Turbat:* Ding, Drab—.

CYNODON Rich.

Perennial glabrous grasses; stems creeping, rooting at the nodes and emitting from them fascicles of barren shoots and flowering stems. Spikes 2-6, in terminal umbels. Spikelets 1-flowered, laterally compressed, sessile, imbricate, alternately 2-seriate and unilateral on a slender keeled rhachis; rhachilla disarticulating above the involucral glumes, produced or not beyond the floral glume. Floret hermaphrodite. Involucral glumes narrow, keeled, acute or subulate-mucronate, the upper usually deciduous with the floral glume, the lower subpersistent; floral glume exceeding the involucral glumes, navicular, firmly membranous, 3-nerved, awnless, the keel ciliate; palea somewhat shorter than the glume, 2-keeled. Lodicules 2, minute, obovate-cuneate, glabrous. Stamens 3. Ovary glabrous; styles distinct, slightly shorter than the plumose stigmas. Grain oblong, subterete, free within the glumes.—Species 3, India, of which one is cosmopolitan.

C. dactylon Pers. is used medicinally in Madagascar, La Reunion, and South Africa; *C. hirsutus* Stent. in Basutoland.

1. **Cynodon dactylon** Pers. Syn. I (1805) 85.—PLATE 1020.

Stem slender, prostrate, widely creeping, forming matted tufts, with slender erect or ascending flowering branches 7.5-30 cm. high. Leaves 2-10 cm. by 1.25-3 mm., narrowly linear or lanceolate, finely acute to pungent, more or less glaucous, soft, smooth, usually conspicuously distichous in the barren shoots and at the base of the stems; sheaths tight, glabrous or hairy, sometimes bearded at the mouth; ligule a very fine ciliate rim. Spikes 2-6, radiating from the top of a slender peduncle, 2.5-5 cm. long, green or purplish; rhachis slender, compressed or angled, scaberulous. Spikelets 1.7-2.5 mm. long; rhachilla produced, very slender, equalling ½ the length of the spikelet. Involucral glumes lanceolate, acute to subulate-mucronulate, the lower 1-1.6 mm. long, the upper slightly longer; floral glume obliquely oblong to semiovate, about 2 mm. long. Anthers oblong, 1 mm. long. Grain 1.05 mm. long.

Distribution: Cosmopolitan.

The plant is acrid, sweet, cooling; useful in biliousness, thirst, vomiting, burning sensation, bad taste in the mouth, hallucinations, epileptic fits, fatigue, leprosy, scabies, skin diseases, dysentery, fever, erysipelas, epistaxis (Ayurveda).

The plant is bitterish; vulnerary, expectorant; useful in vomiting, diarrhœa, cobra-bite, burning sensation, diseases of the blood, stomatitis, epistaxis, bruises, biliousness, hiccough (Yunani).

The expressed juice is astringent and is used as an application to fresh cuts and wounds. It is also diuretic and is used in cases of dropsy and anasarca, also as an astringent in cases of chronic diarrhœa and dysentery. It is also useful in catarrhal ophthalmia.

The expressed juice is used in hysteria, epilepsy, insanity (B. D. Basu).

In the Konkan, the grass is prescribed in compound decoctions with more active drugs for the cure of dysentery, menorrhagia, &c. A white variety, which appears to be only a diseased state of the plant, is used medicinally by the native practitioners. It is acidulous and is used to check vomiting in bilious complaints.

A preparation of the plant is applied by the Santals in parasitic disease, which attacks the spaces between the toes (Campbell).

The roots crushed and mixed with curds are used in cases of chronic gleet. A cold infusion often stops bleeding from piles.

The decoction of the roots is used in Mysore for secondary syphilis. The Mundas use it as a diuretic, especially in dropsy.

In Madagascar, the whole plant, or the rhizome alone, is applied topically in gout and rheumatic affections.

Europeans in the Transvaal use the plant for heartburn. It is taken bruised and mixed with sodium bicarbonate and other substances. The bruised plant alone is applied as a styptic to wounds.

The Xosas use a decoction as a lotion for sores and swellings.

The plant is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Afrikaans: Batawiese kweek, Fynkweek, Kwagga, Kwaggakweek, Kruisgras, Oostindiese kweek—; *Antsianaka:* Arampandrotra—; *Bengal:* Dub, Dubla, Durba—; *Betsileo:* Kindrese—; *Canarese:* Garikehullu—; *Catalan:* Agram, Gram—; *Central Provinces:* Dhupsa, Hariali—; *Cutch:* Chhabar, Chhabbar—; *English:* Bahama Grass, Bermuda Grass, Couch Grass, Creeping Panic Grass, Devil's Grass, Doab Grass, Dog's Tooth Grass, Doob Grass, Doorwa, Doub Grass, Dun Grass—; *French:* Chiendent pied de poule, Gros chiendent, Herbe des Bermudes, Pied de poule—; *Gujerati:* Dhro, Dhrokad, Gharo—; *Hausa:* Kirikiri—; *Hindi:* Dhoboghas, Dub, Dubra, Durba, Kabbar, Kalighas, Khabbal, Romghas—; *Hova:* Fandrotararana—; *Jhalawan:* Char, Chobi, Godmaz—; *Konkani:* Dhurva, Harialy—; *Languedoc:* Limaoussa—; *Las Bela:* Sabah—; *Loralai:* Sabah—; *Madagascar:* Kindresy—; *Malta:* Capriola, Couch Grass, Doub Grass, Gramigna, Nigem—; *Marathi:* Dhurva, Durva, Harialy, Karala—; *Menabe:* Fandrahana—; *Mundari:* Dubila, Dubilatasad, Dubitasad—; *Nasirabad:* Kabb—; *North-West Provinces:* Duba, Kalighas, Ramghas—; *Punjab:* Daurva, Dun, Dubra, Kabbar, Khabbal, Talla, Tilla—; *Rajputana:* Dob, Nilldub—; *Sadani:* Dublaghas—; *Sakalave:* Fandrotsana, Fandrotsarana—; *Sanskrit:* Amari, Amrita, Ananta, Anuvallika, Asitalata, Bahuvirya, Bhargavi, Bhutahantri, Dhurta, Dhurva, Durmara, Gauri, Guna, Harasalika, Harita, Haritali, Jaya, Kachharuha, Mahaushadhi, Mahavari, Mangala, Nanda, Niladurva, Ruha, Sahsravirya, Saumya, Shadvala, Shambhavi, Shanta, Shashpa, Shataparva, Shatagranthi, Shatavalli, Shatmula, Shita, Shitakumbhi, Shitala, Shiva, Shiveshta, Shyama, Tiktaparva, Vamini, Vijaya—; *Santali:* Dhobighas—; *Sind:* Chhabar, Chhabbar, Chibbur—; *Sokoto:* Tsarkryarzomo—; *South Africa:* Bahama Grass, Bermuda Grass, Bermuda Quickgrass, Devil's Grass, Doab Grass, Dub Grass, Fine Couchgrass, Florida Grass, Germiston Grass, Scotch Grass—; *Spanish:* Grama comun—; *Suto:* Mohlwa, Morara—; *Tagalog:* Cauatcauaran, Colatay, Malit—; *Tamil:* Arugampillu, Hariali—; *Tasmania:* Indian Couch—; *Telugu:* Ghericha—;

Trans Indus: Burawa—; *Upper Godavery:* Haryali—; *Urdu:* Dub—; *Xosa:* uQaqaqa—; *Zulu:* isiNandi, umFulwane, uNgwengwe—.

ELEUSINE Gaertn.

Annual or perennial; leaves long, flat or folded, flaccid or firm; spikes in interrupted spikes or the upper or all in a terminal umbel, straight, suberect, spreading or deflexed; spikelets glabrous, 3-6-flowered, laterally compressed, densely imbricate, alternately biseriate, unilateral, sessile on a flattened rhachis, the uppermost terminal, perfect; rhachilla disarticulating above the involucral glumes and between the flowering glumes, or tough, produced, sometimes terminating with a rudimentary glume. Flowers bisexual. Involucral glumes 2, subequal, persistent, obtuse or obscurely mucronate, membranous, strongly keeled, 3-5-nerved, the lateral nerves close to the keel, the lower shorter, with the keel crested. Flowering glumes very similar, 3-nerved near the base; lateral nerves submarginal above, with 1-2 short additional nerves close to the keel. Pales slightly shorter than the glumes, 2-keeled, keels winged. Lodicules 2, minute, cuneate. Stamens 3. Ovary glabrous; styles slender from a broadened base, distinct; stigmas plumose, laterally exserted. Grain broadly oblong to globose, broadly grooved; pericarp loose, delicate, breaking up irregularly or almost circumscissile; seed finely striate; embryo suborbicular, basal; hilum punctiform, basal.—Species 6.—In the warm regions of the E. hemisphere. One widely spread through the tropics.

1. Spike stout, often incurved, pubescent at base. Seed globose .... 1. *E. coracana.*
2. Spike slender, nearly glabrous at base. Seed oolong, obtusely trigonous .... 2. *E. indica.*

E. indica Gaertn. is used medicinally in Cambodia and Guiana, *E. coracana* Gaertn. in South Africa.

1. **Eleusine coracana** Gaertn. Fruct. I (1788) 8, t. 1.

60-120 cm. high with the leaves often far overtopping the stem 5-7 mm. broad with compressed loose sheaths and ligule of hairs. Spikes 4-7, suberect with their ends or whole spike frequently incurved, rhachis of spikes often pubescent at base, somewhat 3-gonous, or back flattened. Spikelets much congested, awnless, 3-6-flowered. Flowering glumes often with 1-2 nerves in the sides, variable in size, up to 5 mm. long. Seed globose, dark brown, smooth in some varieties, at other times somewhat rugose, about 1.75 mm. diam. with a depressed black hilum and slightly flattened on one side.

Distribution: Cultivated in the tropics of the Old World for its seed.

The grain is acrid, bitter, sweet; tonic, cooling; useful in biliousness, "tridosha," blood diseases (Ayurveda).

The grain is said to be astringent.

In South Africa, the Tongas and Shangaans use it along with *Plumbago zeylanica* Linn. as an internal remedy for leprosy.

Narayana and Morris have analysed the protein of the grain. Eleusinin, an alcohol soluble protein, constitutes about 10 per cent of the total (16th Ind. Sc. Congress; Madras, 1929).

Bengal: Marua—; *Bombay:* Nagli, Nangli—; *Canarese:* Ragi—; *French:* Coracan, Eleusine coracana—; *Gujerati:* Bavtonagli, Navtonagli—; *Hasada:* Sikuarkode—; *Hausa:* Tamba—; *Hindi:* Makra, Mandua, Marua, Rotka—; *Konkani:* Gonddo, Nachno—; *Marathi:* Nachiri, Nagli—; *Mundari:* Agankode, Dasaikode, Dumbakode, Indikode, Kode, Loeongkode, Pundikode—; *Naguri:* Hudingkode, Laprakode, Marangkode, Teperakode—; *North-West Himalayas:* Koda, Kodon, Kodra, Kutra—; *North-West Provinces:* Makra, Mandua, Marua, Rotka—; *Oudh:* Makra, Mandua, Marua, Rotka—; *Persian:* Mandwah—; *Portuguese:* Nachinim—; *Punjab:* Chalodra, Koda, Kodon, Kodra, Mandal—; *Sanskrit:* Bahupatraka, Bhuchara, Guchha, Kadhina, Kanisha, Lanchhana, Maliyasa, Narttaka, Nrityakunda, Ragi, Raji, Rajika—; *Santali:* Kode—; *Shangaan:* Liphokho—; *Sind:* Nachni, Nangli—; *Sinhalese:* Kurakkan—; *Tamil:* Kelvaragu, Kayur—; *Telugu:* Ragulu, Tamidelu—; *Uraon:* Kodai—; *Zulu:* uPoko—.

2. **Eleusine indica** Gaertn. Fr. I (1788) 8.

Annual, erect; stem 30-60 cm. high, tufted, slightly compressed, glabrous; roots of strong fibres. Leaves distichous, flat or folded, as long as the stem, 3-6 mm. broad, linear, glabrous or sparsely hairy, with nearly smooth margins; sheaths compressed, the mouth not auricled but often with a few hairs; ligule a thin slightly hairy membrane. Spikes 2-7 or more, 5-12.5 cm. long, with sometimes one or two detached spikes below the umbel, digitate, suberect or slightly recurved, the axils hairy and glandular; rhachis flattened. Spikelets pointing forward at an acute angle with the rhachis of the spike, variable in size, 2.5-4 mm. long, 3-6-flowered, glabrous. Involucral glumes unequal, membranous; lower 1.6 mm. long, ovate-oblong, acute, 1-nerved; upper 2.5 mm. long, ovate-oblong, subacute, very shortly apiculate, with 3-7 green nerves; floral glumes gibbously ovate-oblong, obtuse, 3 mm. long; palea shorter than the glume, oblong-lanceolate, subacute. Anthers 0.8 mm. long. Grain oblong, obtusely trigonous, obliquely striate, reddish brown.

Distribution: Throughout the plains of India, Ceylon.—Tropics of the Old World.

In Guiana, a decoction of the plant is given to children for convulsions.

The whole plant, but more especially the root, is considered diaphoretic and antipyretic in Cambodia. It is much used in liver complaints.

Bundelkhand: Gurchawa—; *Burma:* Hsengnomyeet, Singnomyet—; *Cambodia:* Choeung kras—; *Central Provinces:* Godchabba, Gurragadi, Kakariya, Madanya, Malghi, Mandial—; *French Guiana:* Pied de poule—; *Gujarat:* Adbaunagli—; *Hausa:* Chiyawartuji, Tuji—; *Hindi:* Malankuri—; *Kumaon:* Mandavi—; *Malay:* Rumput sambau—; *Marathi:* Rannachani—; *Mundari:* Sukurikode—; *North-Western Provinces and Oudh:* Gadha, Gadhacharwa, Gathamandwi, Jhingri, Jhinjhor, Lijhar, Makraila—; *Philippines:* Baquisquisan—; *Rajputana:* Mandwa—; *Sesuto:* Moseli—; *Shahrig:* Chhabal—; *Sinhalese:* Walkurakkan—; *South Africa:* Crowfoot, Goose Grass—; *Tagalog:* Sabongsabongan, Sambale—; *Telugu:* Karuchodi, Kuror—; *Zulu:* uMunyankomo, umNyankomo, uPoko—.

PHRAGMITES Adans.

Tall perennials with a creeping rhizome; stem stout, hollow, leafy upwards. Leaves long, flat. Panicle lax, usually very large and decompound. Spikelets conspicuously silky from the long hairs on the callus, loosely 3-10-flowered, awnless; rhachilla disarticulating above the lower and between the following floral glumes, slender, penicillate with long hairs, not produced beyond the flowering glumes. Glumes glabrous; involucral glumes unequal, oblong-lanceolate, acute, 3-nerved, membranous persistent; floral glumes heteromorphous, the lowest linear-lanceolate, much exceeding the involucral glumes, the following very thin, more or less caudate-acuminate, hyaline, 3-nerved; callus long, slender, densely clothed with very long silky hairs. Paleæ linear-oblong, about half as long as their glumes, 2-keeled. Lodicules 2 (sometimes 3 in the lower floret). Stamens 3 (sometimes 2 in the lower floret). Styles 2, distinct, rather short; stigmas laterally exserted, densely plumose. Grain oblong, semiterete.—Species 2.—One cosmopolitan and one in Argentine.

P. maxima Blatter and McCann is used medicinally in China and in Europe.

1. **Phragmites maxima** Blatter & McCann in Blatter & McCann Bombay Grasses (1933)—*P. Roxburghii* Steud. Nomen. ed. 2, 324.

Stems erect, 120 cm. to 3 m. high, sometimes much taller or dwarfed, smooth, simple or branched, covered with the leaf-sheath. Leaves close, bifarious, linear, acuminate, reaching up to 4 cm. broad, coriaceous, smooth, base contracted, margins smooth; sheaths loose, glabrous, the mouth auricled; ligule a ciliate line. Panicle up to 60 cm. long, erect, oblong; branches widely spreading, filiform. Spikelets when fully expanded about 12 mm. broad across the glumes; pedicels capillary, smooth; callus densely clothed with long silky hairs. Glumes glabrous; lower involucral glume 3-5 mm. long, oblong- lanceolate or -linear, acute, 3-nerved; upper involucral glume 4-6 mm. long, oblong-lanceolate, acute, 3-nerved; lower floral glume 4-10 mm. long; upper floral glume equally long or rather longer than the lower. Pale about 2.5 mm. long, linear-oblong. Anthers about 2 mm. long.

Distribution: Cosmopolitan.

The plant is sweet, acrid; cooling, aphrodisiac; useful in biliousness, urinary troubles, vaginal and uterine complaints, erysipelas, heart diseases (Ayurveda).

The root of this reed is regarded as cooling and diuretic by the Chinese. It is considered diuretic and diaphoretic in Spain.

Bengal: Nal—; *Burma:* Kaing—; *Canarese:* Hulugalagu, Hulugilahullu, Hulugilu—; *Catalan:* Canya borda, Canya de escombretas, Canyis, Canyisos—; *Chinese:* Lu—; *English:* Nodding Reed—; *French:* Cannette, Petit roseau, Roseau a balai, Roseau aquatique, Roseau des marais—; *Garhwal:* Bichhra—; *Gujerati:* Nairi, Nali—; *Hindi:* Nainarakula, Narkul, Nulanara—; *Hova:* Barorata, Katsaoka, Volotara—; *Irish:* Giolcach—; *Italian:* Canela de Ema, Canna palustre, Cannuccia—; *Kumaon:* Karka, Khaila, Khailuwa, Nal—; *Languedoc:* Rouza, Rouzo—; *Loralai:* Nal, Nar—; *Malayalam:* Nadam, Nalam, Nannana, Naval—; *Malta:* Common Reed, Spire Reed, Canna di palude, Canna da spazzole, Kasbiet irrih—; *Marathi:* Deonala, Nala—; *Punjab:* Bagnarri, Dila Nai, Nal, Nar, Nara, Naria—; *Pushtu:* Drumbi, Dwarena, Ghwarga—; *Roumanian:* Rogoz—; *Sanskrit:* Dhhamana, Nada, Nala, Potagala, Shunyamadhya—; *Shahrig:* Nal—; *Spanish:* Caneta, Carrizo—; *Tagalog:* Tambo—; *Tamil:* Perunanal—; *Telugu:* Kikkasagaddi, Mettantisa, Nagasvaramu, Peddarellu. Puvvuguttigaddi—; *Uriya:* Nolo—; *Zhob:* Nal—.

DACTYLOCTENIUM Willd.

Annual or perennial; leaves flat, subflaccid; spikes in umbels of 2-6, erect or stellately spreading; tips of the rhachis barren, mucroniform, usually curved. Spikelets 3-5-flowered, laterally compressed, densely imbricate, biseriate, sessile, unilateral on a flattened rhachis, the uppermost reduced; rhachilla tardily disarticulating above the empty glumes, tough between the flowering glumes. Flowers bisexual, the uppermost rudimentary. Involucral glumes 2, unequal, strongly keeled, the lower ovate, acute, thin, persistent, the upper elliptic-oblong in profile, obtuse, mucronate or awned, firm, deciduous. Flowering glumes ovate, subacuminate, 3-nerved, mucronate or awned, deciduous with the grains. Pales about as long as the flowering glumes, 2-keeled, subpersistent. Lodicules 2, cuneate, minute. Stamens 3. Ovary glabrous; styles distinct, very long, subterminally exserted. Grain subglobose, slightly laterally compressed, not grooved or hollowed, rugose or punctate; pericarp very delicate, irrugularly breaking away; embryo scarcely equalling ½ the length of the grain; hilum basal, punctiform.—Species 5.—Warm regions.

D. aegyptiacum Rich. is used medicinally in Cochin China.

1. **Dactyloctenium aegyptium** Rich. Pl. Europ. I (1889) 68.—*Eleusine aegyptiaca* Desf. Fl. Atlant. I (1798) 85.—PLATE 1022 (under *Eleusine aegyptiaca* Desf.).

Annual 10-40 cm. high. Stems sometimes prostrate, rooting from the proliferously branched nodes; culms geniculately ascending, compressed, 2-3-noded, glabrous, smooth, internodes exserted. Sheaths striate, the lower whitish, keeled above, glabrous, or scantily hispid; ligules membranous, very short, scantily ciliolate; blades linear, tapering to a fine point, 2-10 mm. long, 2-4 mm. broad, flat, subflacid, glaucous, glabrous or hispid or hispidly ciliate, hairs tubercle-based. Spikes 2-6, rarely solitary. 0.5-4 cm. long, light or dark olive-grey; rhachis keeled, scabrid. Spikelets 3-5-flowered, spreading at right angles, up to 3 mm. long, glabrous; lower empty glume about 0.75 mm. long, the upper cuspidately mucronate or awned; awn curved, sometimes exceeding the glume; flowering glume 2-3.5 mm. long, mucronate or awned. Anthers about 0.5-0.75 mm. long. Grain 0.5-1 mm. long, very rugose, reddish.

Distribution: Spread throughout tropical and subtropical regions.

The grains are used medicinally by the Mundas of Chota Nagpur; they are parched in an earthen vessel and consumed in small doses for three to eight days, by women who after childbirth suffer from bellyache.

A decoction of the seeds is renowned in Africa as an alleviator of pains in the region of the kidney, and its herbaceous parts are applied externally for the cure of ulcers.

Annam: Co chi trang—; *Bombay:* Mhar, Nachani, Nagli, Natchni, Raj—; *Bundelkhand:* Makamakna, Tipakia—; *Central Provinces:* Chikara, Chotamandiya, Mathna, Utesirkum, Utesirla—; *Hindi:* Makra, Makri—; *Malayalam:* Kavarapullu—; *Mundari:* Bulungcuri, Bulungkode, Bulungruti, Bulungrutui—; *Punjab:* Bhobra, Chimbari, Chubrei, Karmadhana, Madana, Madhana—; *Rajputana:* Malicha, Maligha, Mansa—; *Sadani:* Nonmarua—; *Santali:* Suntubukrui—; *Sinhalese:* Putatana—; *South Africa:* Coast Grass, Duck Grass—; *Tagalog:* Alam—; *Tamil:* Sodi, Tamida—; *Telugu:* Muttengapillu—; *Uriya:* Kakuriya—; *Zulu:* isiNandi, isInane, uNgwengwe—.

AGROPYRON J. Gaertn.

Annual or perennial grasses. Leaves flat or convolute. Spikelets 3-many-flowered, solitary, sessile, distichously arranged opposite to hollows in the rhachis of a simple spike, with the sides of the glumes opposite the rhachis; rhachilla usually jointed between the flowering glumes. Glumes I and II empty, opposite, (not collateral) narrow, unequal, persistent; flowering glumes rigid, awned or not; nerves 5-7, converging above; keels of palea ciliate. Lodicules entire or ciliate. Stamens 3. Ovary hispid at the top, styles short, distant. Grain narrow, grooved in front, adherent to the palea or not.—Species 45.—Temperate.

A. repens Beauv. is used medicinally in Europe. It is officinal in France, Switzerland, and Turkey.

1. **Agropyron repens** Beauv. Agrost. 102.—*Triticum repens* Linn. Sp. Pl. 86.

Stems 30-60 cm., very slender, densely tufted at the base, erect or ascending. Leaves flat, or convolute when dry, 2-3 mm. broad, smooth, glabrous or puberulous above. Spike slender, 7.5-15 cm., erect, rhachis slender, margins of hollows quite glabrous. Spikelets rather distant, 5-6-flowered, 13-17 mm., oblong, very pale, quite glabrous, internodes of rhachilla short nearly glabrous; glumes rather spreading, glumes I and II unequal linear or linear oblong, obtuse, acute or notched at the tip, strongly 3-5-nerved, margins scarious, II much shorter than III; flowering glumes linear obtuse or obliquely retuse or notched strongly 3-5-nerved in the upper half; calli quite glabrous; keels of palea smooth.

Distribution: Kashmir, W. Tibet, 8,000—14,000 ft.

The rhizome is diuretic, demulcent, and aperient. It is used internally as a demulcent drink for irritable bladder, and in cystitis. It is also recommended in gout and rheumatism.

The plant has been employed in England from remote times as a vulnerary, and to remove difficulties of urination.

Catalan: Agram, Gram—; *Chinese:* Se Mao Ts'ao—; *Dutch:* Kweek—; *English:* Couch Grass, Dog Grass, Quick Grass, Quilch, Tare, Twitch Grass—; *French:* Agram, Agropyre rampant, Auge, Ble sauvage, Chiendent, Chiendent des boutiques, Chiendent officinal, Chiendent ordinaire, Froment rampant, Herbe a deux bouts, Laitue de chien, Petit chiendent, Sainte neige, Tranuge, Vagon, Wagon—; *German:* Ackergras, Ackermannswurzel, Bagenwúrzel, Fadenwurzel, Fegwurzel, Fletchgras, Graswurzel, Haarstrang, Hundsgraswurzel, Hundsruecken, Knotengras, Kriechweizen, Landdreck, Paeden, Peden, Peyer, Poeden, Queck, Rebel, Ribel, Schnur, Schweinegras, Sehnengras, Spulwurz, Tuerkisches Gras, Weisswurz, Wreeten, Wuemgras, Wurmgras, Zweckenwurzel—; *Greek:* Agrostis—; *Italian:* Caprinella, Dente canino, Gramigna, Granacina—; *Polish:* Perz—; *Portuguese:* Grama—; *Provence:* Grame—; *Roumanian:* Albeiu, Iarba caineasca, Pir—; *Russian:* Eja, Pirei, Porei—; *South Africa:* Couch Grass, Dog Grass, Triticum—; *Spanish:* Grama, Grama de las boticas—; *Swedish:* Quick hwete—; *Tasmania:* Couch—.

TRITICUM Linn.

Annual or perennial grasses with flat leaves. Spikelets sessile tumid, distichously spicate with their sides opposite recesses in the articulate or inarticulate rhachis, solitary in the cavities. Glumes few, rigid, often unequal-sided; I and II empty, obtuse or shortly awned, few-nerved, persistent; flowering glumes oblong or ventricose, dorsally rounded or keeled above, awnless or 1-3-awned, 5-9-nerved, lateral nerves not conniving with the central; upper flowers male or neuter; palea with ciliate keels. Lodicules entire, ciliate. Stamens 3. Styles very short. Grain grooved ventrally, often hairy, free or adhering to the palea.—Species 15.—Mediterranean, Europe, W. Asia.

T. aestivum Linn. is used medicinally in Europe; *T. aestivum* Linn., *T. amyleum Ser.*, *T. durum* Desf., *T. spelta* Linn. in Brazil.

Official :—The rhizome of *T. repens* Linn. (Austria, Belgium, Hungary)=*Agropyrum repens* Beauvais (Portugal).

The seeds of *T. aestivum* Linn. and its various races in Portugal.

The flour from the seeds of *T. sativum* Linn. in France.

The starch from the seeds of *T. sativum* Lamk. in Belgium, Germany, Great Britain, Hungary, Italy, Russia, Sweden, Switzerland, Turkey; *T. vulgare* Vill. in Austria, Denmark, France, Holland, Norway; *T. vulgare* Willars in Spain.

1. **Triticum aestivum** Linn. Sp. Pl. (1753) 86.—*T. sativum* Lam. Fl. Fr. ed. 1, III (1778) 625.

Tufted, annual grasses. Culms tufted; sheaths striate; ligule a lacerated membranous ring. Leaves glabrous or hairy on one or both surfaces. Spike glabrous or hairy, awned or awnless; spikelets 2 ranked, compressed, parallel to the rhachis, closely or loosely imbricate. Glume I keeled upwards; glume II sometimes paleate; glumes III and IV paleate and hermaphrodite, larger than V and succeeding glumes when present. Stamens 3; stigmas short and never protruded; ovary truncate and hairy on top. Grains in each spikelet, usually 3, the 2 lateral larger than the single terminal one (in examples when there are 4 grains in a spikelet the 2 lower ones are invariably larger than the upper 2), in shape they are oblong, swollen more or less according to the quality, with a groove on one face, blunt at both ends or pointed surrounded by a hairy tuft.

Distribution: Cultivated.

The seed is cooling, oleaginous, indigestible; tonic, aphrodisiac, laxative, fattening; increases appetite and taste; useful in " vata ", biliousness, " tridosha " (Ayurveda).

In China, the grains are roasted and are considered useful in colliquative sweating, especially in tuberculosis in women.

Afghanistan: Ganam, Gandam—; *Afrikaans:* Koring—; *Arabic:* Burr, Hintah—; *Ashkobi:* Spinghanam, Wasaghanam—; *Bagwana:* Dayak, Kandahari, Kub, Shorawaki, Shuthardandan, Sundia, Trimali—; *Bengal:* Gam, Giun, Gom—; *Bombay:* Gahu, Ghawn, Ghawutghum, Gium, Gohum, Kapale, Marghum—; *Brazil:* Trigo, Trigo candeal, Trigo tremez—; *Burma:* Giyonsaba, Gyungsaba—; *Canarese:* Godhi—; *Catalan:* Blat menut, Xeixa, Xexa—; *Central Provinces:* Ghubot, Seonikar—; *Chinese:* Ch'ao, Cheng Ping, Chiang, Hsiao Mai—; *Deccan:* Gohun—; *Dutch:* Tarwe—; *English:* Wheat—; *French:* Blé, Blé cultivé, Blé marcel, Blé marcet, Blé de mars, Blé d'été, Blé trémois, Froment, Froment cultivé—; *German:* Weizen—; *Gujerati:* Gawn, Ghavum, Govum—; *Harboi Hills:* Ghanam, Kholam, Shirukh—; *Hausa:* Alkama—; *Hindi:* Gehub, Giun, Kunak—; *Hova:* Lafarina, Varimbazaha—; *Hungarian:* Buza—; *Italian:* Frumento, Grano—; *Jhalawan:* Geroli, Sundia—; *Kharan:* Pashmik—; *Khuzdar:* Geroli—; *Kila Saifulla:* Ghanam, Sarghanam, Spinghanam—; *Kirta:* Barkhani, Sungsillah—; *Konkani:* Gahum—; *Languedoc:* Blad, Bladet, Blat, Bled—; *Malayalam:* Gendum, Kotanpam—; *Malta:* Spring Wheat, Grano d'estate, Marzuolo, Civitella, Tomnija—; *Marathi:* Gahum, Gahung—; *Mastung:* Ghanam, Kholam—; *Michi:* Shruk, Tokar, Tomar, Tro—; *Nigeria:* Common Wheat, Egyptian Wheat, Miracle Wheat, Mummy Wheat, Wheat—; *North-Western Provinces:* Gehun—; *Oudh:* Gehun—; *Pab:* Khisankah—; *Persian:* Gandum—; *Portuguese:* Trigo—; *Punjab:* Do, Dro, Gehun, Kanak, Nis, Rozatt, To, Zud—; *Quetta:* Pashmik—; *Roumanian:* Griu—; *Russian:* Pshenitza—; *Sadani:* Gehom, Gohom, Gom—; *Sanskrit:* Arupa, Bahudugdha, Godhuma, Kshiri, Mlenchhabhojana, Nistusha, Rasala, Saman, Sumana, Yava, Yavana—; *Saruna:* Khalam—; *Shahrig:* Boja, Gandun, Ghanam, Kholam—; *Sinhalese:* Tiringu—; *Sohrab:* Pesur, Puzho, Shuthardandan—; *Spanish:* Trigo candeal, Trigo chamorro, Trigo comun, Trigo jejar, Trigo marzal—; *Tamil:* Godumai, Godumbaiyarisi—; *Telugu:* Godumulu—; *Wad:* Sundia—; *Zulu:* uKolo, uKolweni—.

The following races are cultivated in India as elsewhere :

Triticum durum Desf. Fl. Atlantica I, 114.

Portuguese: Trigo durasio—.

Triticum spelta Linn. Sp. Pl. (1753) 86.

Catalan: Escanya major, Espelta—; *French:* Ampeutre, Engrain, Grande épeautre, Froment rouge, Ingrain—; *Spanish:* Escanda, Espelta—.

Triticum amyleum Ser. Mel. Bot. I, 124.

Brazil: Trigo branco—.

Their seeds are considered tonic in Brazil.

HORDEUM Linn.

Erect annual, rarely perennial grasses with flat leaves. Spikelets sessile in 2-more rows spicate in the recesses or at the nodes of a simple inarticulate rhachis, 2-3-nate with the plane of the spikelets tangential to the rhachis, the lateral often imperfect, rhachilla jointed at the base of the flowering glume and produced above it with sometimes an imperfect glume. Glumes 3, I and II empty very narrow, rigid, persistent, the outer of each cluster of spikelets together often resembling an involucre; III 2-sexual dorsally rounded, 5-nerved above, narrowed into an erect or recurved awn; palea 2-keeled. Lodicules ciliate. Stamens 3. Style very short. Grain grooved in front, tip usually villous, adherent to the palea or not.—Species 20.—Temperate regions.

H. vulgare Linn. is used medicinally in Europe, China, Brazil.

OFFICIAL :—The grain of *H. vulgare* Linn. in France, Spain, the United States of America; *H. distichon* Linn. var. *seminibus nudis* Kunth (*H. nudum* Arduin) and *H. hexastichon* Linn. in Portugal.

1. **Hordeum vulgare** Linn. Sp. Pl. (1753) 84.—PLATE 1023.

Annual, 50-100 cm. high, erect. Leaves flaccid, linear, acuminate. Spike (with awns) 20-30 cm. long, 8-10 mm. broad, flattened, 2-ranked, with brittle axis; lateral spikelets stipitate, staminate, muticous; perfect in the middle, sessile, aristate; glume lanceolate-subulate at the base, ciliate-plumose, the longer awns once and a half as long as the sterile flowers, empty glumes of the lateral spikelets muticous; awn of the fertile glume scabrous, 15-30 cm. long.

Distribution: Cultivated chiefly in N. India.—Widely cultivated in temperate regions.

Barley is cooling, sweetish, acrid; aphrodisiac; causes constipation; useful in bronchitis, biliousness, asthma; appetiser; fattening; improves the voice; good for ulcers, burns, anemia, urinary discharges (Ayurveda).

Barley is tasteless; lowers the pulse; allays thirst; useful in biliousness, bronchitis, headache, pains in the chest, inflamed gums, fevers (Yunani).

Barley is demulcent, and easy of digestion, and is for these reasons used in the dietary of the sick. A powder of the parched grains is much employed in the form of a gruel in cases of painful and atonic dyspepsia.

In Patna, the ashes of the leaf are employed in the formation of cooling sherbets. The ashes of the stalks are prescribed for indigestion in the plains of the Punjab.

In European practice, barley water, a decoction of the grain, is principally prescribed, and is valuable in cases requiring demulcent treatment.

Preparations of malt have acquired some reputation of late years in Europe and America, since they are more demulcent and nutritious than those of the unmalted barley.

The germinated barley or malt with the radicle attached to it is used in China and Malaya as peptic, stomachic, lenitive, demulcent, and expectorant. It enters in a number of prescriptions given for infantile complaints.

Afghanistan: Jao, Jaoshirin, Jaotursh—; *Arabic:* Shaair, Shair—; *Armenian:* Kari—; *Ashkobi:* Arbus—; *Bagwana:* Brehnajau—; *Behar:* Jowakhar—; *Bengal:* Jab, Jao, Jau—; *Bhotia:* Nas—; *Bombay:* Jav, Satu—; *Brazil:* Cevada, Cevada sancta—; *Burma:* Muyau—; *Canarese:* Javegodhi—; *Catalan:* Ordi, Ordi comu—; *Chinese:* Kung Mai, No Mai, Ta Mai—; *Danish:* Byg—; *Deccan:* Satu—; *Dutch:* Gerst—; *English:* Barley—; *Finland:* Ohva—; *French:* Béchette, Blé d'Egypte, Blé de mai, Epeautre, Epente, Epinte, Espigan, Orge, Orge commune, Orge grosse—; *German:* Garsten, Gerste—; *Greek:* Krithari, Krithi—; *Gujerati:* Jau, Jav, Ymvah—; *Harboi Hills:* Jau, Sa, Urbusha—; *Hindi:* Jau, Jav, Jawa, Suj—; *Hungarian:* Arpa—; *Italian:* Farro, Orzo, Scandella, Spelita, Spelta—; *Jhalawan:* Jau, Sa, Urbusha—; *Kila Saifulla:* Jau, Sa, Urbusha—; *Konkani:* Cevad, Jav—; *Languedoc:* Espeulto, Espigan, Feraje hordi, Ordi, Ordigal—; *Lapland:* Kordne—; *Lassa:* Soah—; *Malaya:* Mai ngai—; *Malta:* Barley, Orzo, Xghei, Xghei tal birra, Xghei tal mazza—; *Marathi:* Cevad, Jav, Java, Satu—; *Nepal:* Tosa—; *North-West Provinces:* Indarjau, Jau, Yurk—; *Persian:* Jao—; *Polish:* Jenczmien—; *Portuguese:* Cevada—; *Punjab:* Buza, Chak, Chang, Chung, Jau, Jawa, Nai, Thanzatt—; *Roumanian:* Orz—; *Russian:* Jetschmen—; *Sanskrit:* Akshata, Dhanyaraja, Divya, Hayapriya, Hayeshta, Kanchuki, Medhya, Pavitradhanya, Praveta, Shaktu, Shvetashunga, Sitashuka, Sitrishuka, Tikshnashuka, Turagapriya, Yava, Yavaka—; *Sharig:* Jau, Sa, Urbusha—; *Spanish:* Cebada, Cebada comun—; *Swedish:* Biugg—; *Tamil:* Barliyarisi, Barliyarishi—; *Tartary:* Arpah—; *Telugu:* Barlibiyam, Dhanyabhedam, Pachchayava, Yava, Yavaka, Yavala—; *Turki:* Arpa—; *Urdu:* Jav.—.

PASPALUM Linn.

Annual or perennial grasses. Leaves lanceolate or ovate-lanceolate. Spikelets orbicular to oblong, obtuse, 1-flowered, awnless, falling off entire from the very short or obscure pedicels, secund and generally 2-ranked on the flattened or triquetrous rhachis of spikes, plano-convex; lower floret barren, reduced to the floral glume; upper floret hermaphrodite. Glumes 3; lower involucral glume 0; upper involucral glume membranous, as long as the floral glume (rarely shorter or obsolete). Floral glumes equal or subequal; the lower resembling the upper involucral glume; the upper chartaceous to subcoriaceous. Palea subequal to and of the same texture as the upper floral glume. Lodicules 2, connate. Stamens 3. Styles distinct, slender; stigmas plumose, exserted from near the top of the spikelet. Grain tightly enclosed in the hardened floral glume and palea, dorsally subcompressed.—Species over 200.—Chiefly in tropical America.

P. conjugatum Berg. is used medicinally in the Gold Coast.

1. **Paspalum scrobiculatum** Linn. Mant. (1767) 29.

Annual; stems 60-90 cm. long, tufted on a very short rhizome, erect (rarely ascending), leafy from the base upwards, glabrous. Leaves bifarious, erect or suberect, 15-20 cm. by 2-8 mm., finely acuminate, glabrous or sometimes softly hairy; sheaths 10-20 cm. long, compressed, loose, the mouth hairy, with very short membranous ligules. Spikes 2-6, sessile usually distant and spreading, 2.5-15 cm. long; rhachis herbaceous, 2-3 mm. broad with ciliate margins. Spikelets usually 2-ranked, 2-3 mm. diam., sessile or shortly pedicellate, broadly elliptic or suborbicular, imbricate. Glumes 3; lower involucral glume 0; the upper convex, 3-7-nerved, membranous; lower floral glume flat, membranous, like the upper involucral glume; upper floral glume thickly coriaceous, brownish, shining, striolate; palea orbicular, tumid, thickly coriaceous like the upper floral glume, dorsally convex, ventrally strongly inflexed below the middle and forming 2 broad membranous auricles that embrace the grain.

Distribution: Tropics of the Old World.

The plant is sweetish, bitter; tonic, alexiteric; useful for ulcers; causes constipation, flatulence, "vata", "kapha", hallucinations, dysuria (Ayurveda).

The plant is styptic; useful in inflammation, diseases of the liver; causes constipation, and heats the body (Yunani).

Sushruta prescribes the plant in combination with other drugs for the treatment of scorpion-sting.

The plant is not an antidote to scorpion-venom (Caius and Mhaskar).

Bengal: Kodoadhan—; *Bihar:* Koda, Kodai—; *Bombay:* Harik, Kodra, Kodri, Kodro, Kodroakora, Pakod, Pakodi—; *Canarese:* Harik—; *Central Provinces:* Kodie, Kodo—; *Ceylon:* Koda Millet—; *Gujerati:* Kodra, Kodro, Menya—; *Hausa:* Tumbijaki—; *Hindi:* Koda, Kodaka, Kodava, Kodo—; *Konkani:* Pacodd, Pacoll—;

Kumaon: Kodo, Kodra, Kodram—; *Marathi:* Harik, Kodra, Kodru—; *Mundari:* Birjane, Pirijane, Tasadjane—; *North-West Provinces:* Koda, Kodon, Kodram—; *Porebunder:* Kodo—; *Punjab:* Kodon, Kodra—; *Sanskrit:* Koddara, Kodrava, Koradusha, Kordrava, Kuddala, Madanagraka, Uddala, Vanakodrava—; *Santali:* Janhe—; *Sinhalese:* Amu, Karalamu, Walamu—; *Tagalog:* Paragis, Sabungsabungan—; *Tamil:* Varagu, Varaku—; *Telugu:* Allu, Alu, Arikalu, Arike, Aruga, Kiraruga, Pataarige—; *Urdu:* Kodon—; *Zulu:* izAmuyisane—.

PENNISETUM Pers.

Annual or perennial grasses. Leaves narrow. Inflorescence of spike-like racemes of involucellate clusters of shortly pedicellate spikelets articulate on a simple rhachis; involucels consisting of unequal scabrid or plumose simple or branched bristles. Spikelets 1-6 in each involucel, persistent on their pedicels, 1-2-flowered, obovoid or lanceolate. Glumes 3 or 4; lower involucral glume small or 0; upper involucral glume subequal to the lower floral glume, 5-7-nerved, awned or not, rarely absent; lower floral glume paleate or not, male or empty; upper floral glume sessile, coriaceous, 2-sexual or female. Lodicules 2. Stamens 3; anthers linear. Styles long, free or connate below. Grain oblong, free within the hardened glume and palea.—Species about 40.—In most warm countries.

1. Annual .... 1. *P. spicatum.*
2. Perennial .... 2. *P. compressum.*

P. compressum R. Br. is used medicinally in China.

1. **Pennisetum spicatum** Roem. & Schult. Syst. Veg. II (1817) 499.—*P. typhoideum* Rich. in Pers. Syn. I (1805) 72.

Annual. Culms tall, erect, stout, terete, 0.9-1.8 m. high, rooting at the lower nodes, sometimes woolly, pubescent below the inflorescence. Leaves 30-90 cm. by 6-50 mm., linear to linear-lanceolate from a rounded base, acute, flat, more or less rough, glabrous, rarely hirsute; sheath terete, rather inflated, glabrous except the bearded nodes and the often villous junction with the blade, rarely hirsute, usually slightly rough, rather shorter than the internodes, ligule a narrow, long and densely ciliate rim. Panicle spike-like, cylindric, very dense, 10-20 cm. long, often purplish; rhachis stout, villous; branchlets reduced to a peduncled involucrate cluster of 1-8 spikelets; peduncles villous, straight, 2.5-5 cm. long, often horizontally spreading or partly deflexed; involucre of very numerous ciliate often purplish bristles about as long as the spikelets. Spikelets sessile or shortly pedicelled within the involucre, readily deciduous when ripe, oblong, 5-6 mm. long, pale or purplish upwards. Lower involucral glume minute or 0, half-orbicular or subquardate, 1-3-nerved; upper variable in length, sometimes absent, usually $^{1}/_{6}$-$^{1}/_{2}$ the length of the upper floral glume, subquadrate, truncate, obtuse or retuse, 3-nerved, very rarely as long as the upper floral glume and coriaceous. Lower floral glume ovate-oblong, obtuse or truncate and apiculate, 5-nerved, epaleate or paleate, male or neuter, rarely bisexual; upper coriaceous or herbaceous, ovate, acute, 5-7-nerved, pale very broad, truncate, ciliate at the tip and dorsally, nerves 2, approximate, excurrent. Lodicules 0. Anthers linear, 2.5-3 mm. long, tips bearded. Styles connate. Grain oblong, obovoid, or pyriform, smooth, free, top exposed.

Distribution: Cultivated in numerous forms in India, northern and tropical Africa.

The plant is tonic, heating, aphrodisiac in women; useful in diseases of the heart; a good appetiser; causes flatulence (Ayurveda).

Ashanti: Ewio—; *Bihar:* Gahuma, Jondhariya—; *Bombay:* Bajera, Bajra, Bajri—; *Canarese:* Sajje—; *English:* Bulrush Millet, Cumboo Millet, Pearl Millet, Spiked Millet—; *Ewe:* Gbekui, Lu—; *Ga:* Ngma—; *Hausa:* Damro, Dauro, Gero, Maiwa—; *Hindi:* Bajera, Bajra, Bajri, Kasajonar, Lahra—; *Krobo:* Ngma—; *Kumaon:* Bajra—; *Malayalam:* Mattari—; *North-Western Provinces:* Bajra, Bajra tangunanwa, Bajri, Lahra—; *Punjab:* Bajra, Bajza—; *Sanskrit:* Agradhanya, Nali, Nalika, Nilakana, Nilasasya, Sajaka, Varjari, Varjarika—; *Santali:* Lendha—; *Sesuto:* Nyalothie—; *Shahrig:* Bajari—; *Sind:* Bajaro—; *Tamil:* Kambu—; *Telugu:* Gantelu, Peddaganti, Sajjalu, Sazza—; *Uriya:* Bajramula—; *Zulu:* Nyaloti, Nyawoti—.

2. **Pennisetum compressum** R. Br. Prodr. 193.—*P. japonicum* Trin. in Spreng. Neue Entdeck. II, 76.

Perennial; stem 30-60 cm., densely tufted. Leaves 30-45 cm., very narrow, convolute, silkily villous towards the base; sheath glabrous or ciliate; ligule obscure. Tip of peduncle and rhachis of spike more or less villous. Spikes 5-10 cm., purplish in Indian specimens; involucels pedicelled, pedicels villous; spikelets 6 mm., solitary, lanceolate. Glume I minute or 0; II equal to $^1/_3$-$^1/_2$ of III ovate-lanceolate, acute or obtuse 1-nerved; III ovate acuminate 5-7-nerved epaleate; IV equal to III, 5-nerved. Bristles few, very unequal, one or two much longer than the rest and 2.5 cm. long, all free at the base.

Distribution: Burma.—China, Japan, Tonkin, Australia.

The plant is said to be tonic.
Chinese: Lang Wei Ts'ao.

THYSANOLAENA Nees.

A large glabrous reed-like grass; stems solid. Leaves broad, flat. Spikelets innumerable, very minute, 1-flowered, jointed on very short pedicels and subsecund on the very numerous crowded, long, filiform, compound, suberect branches and branchlets which form a very large effuse pyramidal panicle; rhachilla produced but not beyond the floret. Glumes 4; involucral glumes small, concave, awnless, faintly nerved or nerveless; lower floral glume rather longer than the upper, empty, acuminate, epaleate; upper floral glume ovate, acute, ciliate with long erect white hairs; palea short, truncate. Stamens 2-3; anthers short. Styles free. Grain very minute, free within the hardened glumes.—Species 1.—Tropical Asia.

The genus is therapeutically inert.

1. **Thysanolaena procera** Mez. in Janowski Bot. Archiv. I (1922) 27.—*T. agrostis* Nees in Edinb. New Philosph. Journ. XVIII (1835) 180.— *T. acarifera* Nees & Arnot.

A large handsome grass; stem 10-30 cm. high, reaching sometimes 1 cm. diam., glabrous, polished. Leaves very large, 30-60 by

5-10 cm., coriaceous, linear-lanceolate, tapering to a fine point, many-veined, base cordate; sheaths glabrous, striate, hairy at the mouth; ligule small, ciliate. Panicle large, 30-60 cm. long, soft, glabrous; branches very numerous, suberect, filiform, with many short branchlets carrying small spikelets. Spikelets 1.2-1.6 mm. long, ovoid-lanceolate, acuminate, pedicellate; rhachilla produced into a linear-lanceolate point about 0.5 mm. long. Glumes 4; involucral glumes less than 0.8 mm. long, subequal, about half as long as the floral glumes, ovate, subacute, hyaline, obscurely 1-nerved; lower floral glume longer than the upper, lanceolate, acuminate, membranous, glabrous, epaleate, empty, 1-nerved; upper floral glume ovate lanceolate, acuminate, ciliate with long white erect hairs.

Distribution: Throughout India, Penang, eastwards to New Guinea.

A decoction of the root is used in Chota Nagpur, as a mouth-wash during fever (Campbell).

Hasada: Durhitasad, Duritasad—; *Khond:* Saderi, Saperi—; *Mundari:* Garajopono, Garajono—; *Naguri:* Durhitasad—; *Santali:* Karsar—; *Saora:* Kondachipuru—; *Uriya:* Phulosoro—.

PANICUM Linn.

Annual or perennial grasses, rarely suffruitescent, of various habit and size. Leaves mostly linear to linear-lanceolate, but also ovate or filiform to subulate. Ligules usually reduced to a ciliate rim or a fringe of hairs, rarely a distinct membrane or 0. Panicles usually much divided and at least temporarily open. Spikelets usually loosely scattered, glabrous or hairy, lanceolate to oblong, elliptic or orbicular in outline, symmetrical in profile, rarely somewhat oblique, falling entire or almost so from the often elongated pedicels of a compound or decompound panicle, without a definite orientation towards the axis. Involucral glumes more or less herbaceous-membranous, lower usually shroter than the upper, often very much so, rarely equalling it, usually with 1 or more nerves, or if very small, nerveless; upper as long as the spikelet, rounded on the back, 5-9-nerved. Lower floral glume very similar to the upper involucral glume and equally rounded and curved on the back, 5-9-, rarely 3- or 11- nerved, male or neuter, pale thinly membranous to subhyaline, subequal to the lower floral glume or more or less reduced, rarely suppressed. Upper floral glume subcoriaceous to coriaceous with firm margins, obtuse to subacute, emucronate, faintly nerved, hermaphrodite, pale subequal to the glume and of similar substance, tightly embraced by the more or less involute margins of the glume. Lodicules 2, broadly cuneate. Stamens 3. Styles distinct; stigmas laterally exserted near the tip of the floret. Grain tightly enclosed by the hardened valve and valvule, dorsally compressed, biconvex to almost plano-convex; scutellum elliptic to ovate-elliptic, about half as long as the grain; hilum subbasal, punctiform. —Species 400.—Tropical and warm temperate.

A. Annuals	
1. Spikelets 4.5-5 mm. long	1. *P. miliaceum.*
2. Spikelets 2-3.2 mm. long	2. *P. miliare.*
B. Perennials. Spikelets laxly clustered on the branches	3. *P. antidotale.*

P. miliaceum Linn. is used medicinally in China, *P. helopus glabrescens* K. Schum. in the Transvaal.

The rhizome of *P. Dactylon* Linn. (*Paspalum Dactylon* Lamk.) is officinal in Portugal.

1. **Panicum miliaceum** Linn. Sp. Pl. (1753) 58.

A tufted annual, 0.6-1.2 m. high. Stems erect or geniculately ascending, terete, stout or slender, 4-5-noded, simple or sparingly branched, more or less softly hirsute below the nodes, the uppermost internode usually quite glabrous. Leaf-blades linear from an equally wide or slightly contracted and rounded base, long-tapering to a slender point, 15 to over 30 cm. by 6-20 mm., flat, flexuous, usually glabrous except for the often ciliate lower margins and hispidulous dorsal midrib, rarely sparsely hairy all over, hairs long and fine, midrib somewhat stout and prominent below in large leaves, primary lateral nerves 3-6 on each side, very slender. Sheaths terete, somewhat loose or the upper tight, closely striate, spreadingly hirsute with tubercle-based hairs, pubescent or loosely bearded at the nodes, longer or slightly shorter than the internodes. Ligule a narrow ciliate rim. Panicles contracted and rather dense or open, narrowly oblong, nodding, often with their base permanently enclosed in the uppermost sheath or only shortly exserted, up to 30 cm. long in subspontaneous specimens usually scantier, looser and at length more open, divided up to the fourth or in cultivated specimens the fifth degree, all the divisions filiform, angular and scabrid; primary axis slender or somewhat stout below, subterete, striate or grooved and smooth towards the base; primary branches more or less approximate below, more distant upwards, often much divided from low down; branchlets relatively long, the lower divided again in the same manner or like the remainder from much higher up with spikelets in small loose racemes of 2 (rarely 3) towards the summit; pedicels hardly thickened upwards, with truncate tips, the lateral from less than 2·6 mm. long. Spikelets ovate-oblong to ovate-lanceolate, apiculate-acuminate, turgid, 4.5-5 mm. long, glabrous, green or brownish green. Involucral glumes persistent, unequal, strongly and prominently nerved; lower broad-ovate, acute from $^1/_2$-$^2/_3$ the length of the lower floret, 5-nerved, upper corresponding in size and outline to the spikelet, broadly rounded on the back, 11-nerved, tip contracted, apiculate to shortly rostrate. Lower floral glume barren, very like the lower involucral glume, pale ovate to ovate-oblong, truncate or emarginate, up to about $^1/_3$ the length of the glume. Upper floret hermaphrodite, elliptic-oblong in outline, subacute, very convex on the back, up to over 3 by 2 mm., variously coloured (white, yellow, red, brown or black), very smooth and polished, glume and pale crustaceous. Grain white.

Distribution: India.—Africa and other hot countries.

The plant is sweet, acrid; causes "vata" and biliousness (Ayurveda).

At Shoran, in Baluchistan, the plant is used as a cure for gonorrhœa (Hughes-Buller).

Arabic: Dokhu, Worga, Worglo—; *Ashkobi:* Azhaum, China—; *Bagwana:* Peonprish—; *Bengal:* China—; *Bihar:* China, Chinh, Chinna—; *Bombay:* Chenah, China, Sama, Sawa, Vari, Varikaanu, Varisava, Wadi—; *Bundelkhand:* Bansi, Phikai, Rali—; *Canarese:* Baragu, Bilibaragu, Karibaragu, Save—; *Chinese:* Chi, Shu—;

Deccan: Sava, Sawi, Shamakh, Wari—; *English:* Common Millet—; *French:* Mil, Mil en branches, Mil commun, Mil d'Inde, Petit mil, Millet, Millet commun, Millet à grappes, Millet rond, Millet rouge—; *Gujerati:* Chino, Samli, Vari—; *Hindi:* Chena, Chin—; *Kashmir:* Chinwa—; *Kila Saifulla:* Azhdan—; *Ladak:* Tzedze—; *Marathi:* Barag, Sava, Vari—; *North-Western Provinces:* Chehna, Chinwa, Chirwa, Kuri, Sawanchaitwa, Sawanjethwa—; *Persian:* Arzan—; *Punjab:* Anne, Chena, China, Chini, Salan, Salar—; *Quetta:* Gamh—; *Sanskrit:* Anu, China, Chini, Rad, Varaka, Vrihibheda—; *Shoran:* Chabor—; *Sind:* Chinu—; *Sinhalese:* Mainairi—; *South Africa:* Indian Buffalo Grass—; *Tamil:* Katakanai, Varagu—; *Telugu:* Varagalu, Worga—; *Tobu:* Azhdun—.

2. **Panicum miliare** Lamk. Ill. Gen. I (1791) 173.

An annual grass. Culms 30-90 cm. high, rather slender, erect or base geniculate, simple or branched, usually leafy up to the panicle. Leaves linear, 15-60 cm. by 12-25 mm., gradually tapering from a broad base, glabrous or finely hairy, sheaths glabrous, rarely hirsute with tubercle-based hairs. Panicles very compound, contracted or thyrsiform, and often nodding, 10-25 cm. long (without the subsidiary axillary panicles which are often developed.) Spikelets glabrous, rather flattened, suddenly acute or slightly cuspidate, 2-3.2 mm. long, mostly paired on unequal pedicels, but often solitary at the ends of the branchlets, lanceolate in flower, elliptic or broadly elliptic in fruit. Lower involucral glume very broadly ovate, subtruncate, then suddenly acute, or scarcely acute, about 1/3 the spikelet. white, membranous, 3-5-nerved, nerves arching and anastomosing. Upper involucral glume herbaceous, ovate-lanceolate, 11-13-nerved. Lower floral glume 9-nerved, neuter, pale as long as its glume. Upper floral glume narrow-elliptic or elliptic-oblong to broadly ovate, acute, shining, white or pale brown, or dark brown, often 3-5-streaked dorsally.

Distribution: Cultivated or naturalized throughout India and Ceylon.—Cultivated in the tropics.

It is sometimes used instead of *P. miliaceum*

Bengal: Gondula—; *Bombay:* Warai—; *Central Provinces:* Chika—; *English:* Little Millet—; *Hasada:* Bicagurulu—; *Hindi:* Kungu, Kutki—; *Mundari:* Arabende, Saramcadlomgurulu—; *Naguri:* Hendegudulu—; *North-Western Provinces:* Kutki, Mighri—; *Punjab:* Kutki—; *Santali:* Gundli—; *Sinhalese:* Meneri—; *Tamil:* Chamai, Samai, Shamai—; *Telugu:* Nallachamalu, Nellashama, Nellashamalu—.

3. **Panicum antidotale** Retz. Obs. fasc. 4 (1786) 17; Duthie Indig. Fodder Grasses t. 3.

A tall glabrous perennial grass reaching 1.5 m. high; rootstock creeping, stoloniferous; stem solid, woody, terete, smooth; nodes thickened, the lower sometimes rooting. Leaves 15-60 by 0.6-2 cm., linear, very finely acuminate with capillary tips; sheaths long, glabrous, striate, with naked margins; ligule short, membranous, jagged or fimbriate. Panicle 15-23 cm. long, effuse, pyramidal; rhachis very slender, angular, glabrous or slightly scaberulous; branches usually fascicled (the upper sometimes solitary), 7.5-10 cm. long, filiform, spreading and drooping; branchlets capillary. Spikelets laxly crowded on the branchlets, reaching 3 mm. long or slightly longer, ovoid, acute, glabrous. Glumes 4; lower involucral glume half as long as the upper, broadly ovate, subobtuse, 3-nerved, hyaline; upper involucral glume broadly ovate, acuminate, 7-9-nerved, membranous; lower floral glume equal and similar to the upper involucral glume, paleate, empty or male, the palea oblong, subacute, hyaline, as long as the glume; upper floral glume coriaceous, elliptic, obtuse, with incurved margins, dorsally smooth, yellowish white; palea thinly coriaceous, ovate, acute, as long as the glume. Anthers linear-oblong. Styles 2, distinct, conspicuous, very plumose.

Distribution: Punjab, Upper Gangetic Plain, W. Peninsula, Ceylon.—Afghanistan, Africa and Australia.

The smoke of the burning plant is used for fumigating wounds, also as a disinfectant in small-pox (Stewart).

It is said to be employed in throat affections in Madras.

Gujerati: Dun, Dusghas, Dusto—; *Hindi:* Ghemor, Gunara, Jamur—; *Kulanch:* Gomaz—; *North-Western Provinces:* Gamur, Ghamor—; *Punjab:* Baru, Garm, Ghamrur, Ghamur, Gharam, Ghirri, Girui, Mangrur—; *Pushtu:* Male, Shamukha—; *Rajputana:* Bangagli, Banvari—; *Sadani:* Bende—; *Santali:* Layogundli—; *Shahrig:* Gunj—; *Sibi:* Gam—; *Sinhalese:* Krimisastru—.

ECHINOCHLOA Beauv.

Annual or perennial. Leaf-blades from a slightly constricted or equally wide rarely much attenuated base. Ligules 0 or representd by a transverse fringe of hairs. Panicles of crowded or loosely arranged secund spiciform branches mostly bearing spikelets from the base or near it. Spikelets ovate to elliptic- or lanceolate-oblong, usually cuspidate or awned, very convex on the back, flat or slightly depressed in front, falling entire from the pedicels, 2-nate or clustered, secund and abaxial on the triquetrous rhachis of racemosely arranged false spikes. Involucral glumes unequal, membranous, the lower much shorter, more or less ovate from a clasping base, 3-5-nerved, often mucronate, the upper corresponding in length and outline to the spikelet (as seen from the back), very concave, 5-7-nerved, acute, cuspidulate cuspidate, rarely produced into a short awn. Lower floret equalling the upper glume (excluding cusps or awns); lower floral glume very similar to the upper involucral glume, but flat or depressed on the back and often with a more pronounced cusp or an awn; pale equal to the body of the valve, or in barren florets more or less reduced, hyaline, finely 2-keeled. Upper floral glume ovate to elliptic-oblong, apiculate or obtuse, very convex on the back, subcoriaceous or crustaceous, polished, faintly 5-nerved, margins firm, involute up to near the tip, then flat, not embracing the tip of the pale, pale subequal to the glume and similar in substance, with rounded keels and flaps which thin out towards the flat slightly recurved tips. Lodicules 2, cuneate, fleshy. Stamens 3. Styles distinct; stigmas plumose exserted from near the tips. Grain broad-elliptic dorsally flat, ventrally convex; hilum punctiform, subbasal.—Species about 20-25.—The warm regions of both hemispheres.

1. Lower involucral glume and upper floral glume equally acute or cuspidate .... 1. *E. colona.*
2. Lower involucral glume and upper floral glume cuspidate or produced into an awn, the latter more than the former Ligule absent .... 2. *E. crus-galli.*

E. colona Link. var. *frumentacea* Blatter and McCann, *E. crus-galli* P. Beauv. are used medicinally in China.

1. **Echinochloa colona** Link var. **frumentacea** Blatter & McCann in Journ. Bomb. Nat. Hist. Soc. 32 (1928) 647.—*Panicum frumentaceum* Roxb. Fl. Ind. I (1832) 304.

Tall, robust. Stems erect, from 60-120 cm. high. Panicle often nodding. Spikes secund, incurved, crowded. Spikelets mostly 3-nate, unequally pedicelled, one at least sessile, varying from hispidulous to almost glabrous, and from acute to cuspidulate or rarely distinctly cuspidate.

Distribution: Cultivated over the greater part of India, on the Himalaya up to 6,500 ft.

The plant is sweet, acrid; oleaginous, cooling, digestible; useful in biliousness and constipation; causes flatulence (Ayurveda).

Bengal: Samrashama, Sanwa, Saon, Shamula, Syamadhan—; *Bihar:* Sama, Sanwan, Sawan—; *Bombay:* Bavto—; *Canarese:* Same, Save—; *Central Provinces:* Sawa, Sema—; *Chinese:* Shan Tzu—; *Deccan:* Kangra, Kathi, Kathli, Sanwa, Saon, Sawa, Shama, Shamula—; *Garhwal:* Jhungara—; *Gujerati:* Samo, Samoghas—; *Hindi:* Janglisamak, Samak, Sanwa, Sawa, Shama, Shamula—; *Kashmir:* Karin, Soak—; *Kumaon:* Jhangora, Koni, Kungni, Mandira—; *Marathi:* Janglisama, Samul—; *North-Western Provinces:* Jhungara, Saman, Sawan—; *Oudh:* Sama, Samei, Sanwan, Sawan, Sawanbhadeha—; *Persian:* Bajri—; *Punjab:* Chandra, Sama, Samuka, Sanwak, Sawank, Soak—; *Sanskrit:* Avipriya, Rajadhanya, Shyama, Shyamaka, Sukumara, Tribija, Trinabijottama—; *Sind:* Saon, Saron—; *Sinhalese:* Welmarukku—; *Telugu:* Bontachamalu, Bontashama, Bonthshama, Chama, Chamalu—.

2. **Echinochloa crus-galli** P. Beauv. Agrost. 161; Reichb. Ic. Fl. Germ. I, t. 29, fig. 1411 & 1412.—*Panicum Crus-galli* Linn. Sp. Pl. ed. I, 56.—*P. Crus-corvi* Linn.

Annual, up to 1 m. high. Stems geniculately ascending, branched below, compressed towards the base, glabrous and smooth, internodes enclosed or exserted. Leaf-blades linear, base scarcely narrowed, narrowed to an acute point, 7-25 cm. by 6-, over 12 mm., flat, subflaccid, glabrous, more or less dull greyish-green, smooth or scaberulous below, particularly towards the tip, margins finely cartilaginous, scabrid to almost smooth. Sheaths somewhat loose, the lower often compresed, whitish and thin, the upper subherbaceous, all smooth, glabrous and striate except the basal which are pubescent above their insertion. Ligules 0, junction of blade and sheath glabrous inside marked by a brown zone. Panicles erect, strict or flexuous, at length exserted, 7.5-20 cm. long; axis triquetrous, scabrid; branches few to about 15, solitary or 2-nate, suberect or spreading, distant except the uppermost or all more or less approximate forming a 'lobed' panicle, the lower 2.5-6.2 cm. long, forming rather stout dense mostly many-ranked simple or subcomposite subsecund sessile false spikes; rhachis triquetrous, scabrid, coarsely bristly, particularly near the nodes; pedicels fascicled or 2-nate, very short, up to 1 mm. long, scabrid, bristly at the base, tips subdiscoid. Spikelets crowded, ovate-elliptic in outline, acute, cuspidate or awned 2.5-3 mm. long, greenish or tinged with purple. Lower involucral glume membranous, very broadly ovate, clasping at the base, obtuse to subcuspidate, 1 mm. long, 5-nerved, scaberulous; upper herbaceous-membranous, very broadly ovate-oblong, concave, acute, cuspidate, as long as the spikelet, 5- or (near the tip) 7- nerved, rigidly pubescent between the scabrid and spinulose nerves. Lower floral glume similar to the upper involucral glume, but flat or depressed on the back, cuspidate or produced into a scabrid often long flexuous awn, 7-nerved (at least at the tip), pale elliptic, shorter by 1/4 than its glume, keels scaberulous upwards; upper floret hermaphrodite, elliptic-ovate in outline, cuspidate, over 2 mm. long, whitish or yellowish, polished, glume and pale subcoriaceous. Anthers oblong. Grain broad-elliptic in outline, 1.5 mm. long.

Distribution: Common throughout the greater part of India and Malaya; as a weed throughout the warm temperate countries throughout the N. hemisphere. Rather rare in the tropics of Africa and the New World and South of the Tropic of Cancer.

The plant is used to check haemorrhage, and is prescribed for diseases of the spleen.

Bengal: Burashama, Dul—; *Betsileo:* Ahibary, Aibary—; *Central Provinces:* Baribhodore, Bharta, Datia, Kondabuttamgodi—; *Chinese:* Pai—; *Dutch:* Vingergras—; *English:* Cockspur Grass, Cockspur Panic Grass, Panic Grass—; *French:* Crête de coq, Ergot de coq, Millard, Panis des marais, Panis pied de coq, Palte de poule, Pied de coq—; *German:* Hahnenfussfennich—; *Gujerati:* Adbansamo—; *Hindi:* Samak, Sanwak—; *Hova:* Farimanga, Tsimparifarifolsy, Tsimparifarifary, Tsimparifarimango, Tsimparifarimena—; *Italian:* Cresta de gallo—; *Malta:* Panickgrass, Cock's-shin Grass, Panicastrella, Xrika—; *Marathi:* Sama—; *Mundari:* Camatasad, Iri—; *North-Western Provinces:* Dhand, Jalsawank—; *Punjab:* Barasanwak, Bhunti, Dhand, Jarotha—; *Rajputana:* Horma, Sama—; *Roumanian:* Bujorul—; *Sadani:* Sauna, Sawa—; *Sakalave:* Karangy—; *Sanskrit:* Jalsamoka—; *Spanish:* Daza, Mijo—; *Tagalog:* Dauadaua—; *Telugu:* Peddawundu—.

SETARIA Beauv.

Annual (rarely perennial) grasses of various habit; nodes of stem glabrous or hairy; ligules a ridge of hairs. Spikelets subsessile in contracted, cylindric or pyramidal terminal panicles, articulate on a very short pedicel, subtended by 1 to many persistent scabrid or barbed bristles (modified branchlets) which often form a one-sided involucel, but are sometimes present and absent in the same inflorescence. Glumes 4; lower involucral glume usually much the smallest, 3-5-nerved, membranous; upper involucral glume 5-7-nerved; lower floral glume more or less exceeding and resembling the upper involucral glume, usually paleate; upper floral glume coriaceous or crustaceous, 5-nerved, paleate, the palea about equalling the glume. Lodicules 2, broadly cuneate. Stamens 3. Styles distinct; stigmas laterally exserted. Grain tightly enclosed by the hardened glume and palea, oblong or ellipsoid.—Species 30.—Tropical and warm temparate.

A. Leaves more or less plicate
    Perennial. Culm reaching 2.4 m. .... 2. *S. plicata.*
B. Leaves flat, not plicate
    1. Culm 0.6-1.5 m. high .... 1. *S. italica.*
    2. Stem 30-60 cm. high .... 3. *S. viridis.*

S. italica Beauv., *S. viridis* Beauv. are used medicinally in China; *S. plicata* T. Cooke in La Reunion; *S. sulcata* Raddi in Zululand.

1. **Setaria italica** Beauv. Agrost. (1812) 51.

Annual. Culms erect, tufted, 0.6-1.5 m. high. Leaves linear or lanceolate-linear, acuminate, 7-10 mm. broad or broader. Sheath densely ciliate on margin and mouth. Panicle 7-13 cm. long, 10 mm. wide or more, dense, inclined or nodding, simple, cylindric or lobed or compound; rhachis very hairy. Spikelets oval, 2-2.5 mm. long, in small clusters on the abbreviated branchlets of the panicle, with 2-3 bristles below each pedicel, bristles nearly smooth or microscopically barbellate, 5-8 mm. long, barbs suberect or spreading. Lower involucral glume oblong or subglobose, hyaline, smooth, upper ovate, obtuse or rounded, about 3/4 the length of the upper floral glume, 5-nerved. Lower floral glume hyaline, delicately 4-5-nerved, as long as and same shape as the upper floral glume, but not concave. Upper floral glume oval or elliptic or subglobose, concave, hardening, variable in length, not rugose but smooth and microscopically cancellate.

Distribution: Most warm, temperate and tropical countries.

The plant is sweet, acrid, fattening, aphrodisiac; sedative to the gravid uterus; useful in burning sensations, in healing fractures; causes flatulence (Ayurveda).

A popular domestic remedy for alleviating the pains of parturition.

It is said to act as a diuretic and astringent, and to be of use externally in rheumatism.

Andamans: Tanahal—; *Arabic:* Dukhn—; *Bengal:* Bertia, Chena, Kakni, Kakun, Kangni, Kangu, Kauni, Kirakang, Kiranj, Kora, Rala, Rawla, Tangan—; *Bombay:* Kang, Kangni, Korakang, Vavani—; *Bundelkhand:* Kakun—; *Burma:* Puki, Pyounglaykouk, Zami—; *Canarese:* Naoni, Navani, Vavani—; *Catalan:* Gua de guilla, Cua de guinea, Panis, Panissa—; *Cebu:* Mijo—; *Central Provinces:* Kungni, Rala—; *Chinese:* Liang, Shu, Su—; *Cochin China:* Cay khe—; *Deccan:* Bertia, Chena, Kakni, Kakun, Kangni, Kangu, Kauni, Kirakang, Kiranj, Kora, Rala, Rawla, Tangan—; *English:* Italian Millet—; *French:* Mil à épi, Mil d' Italie, Millet en épi, Millet des oiseaux, Panis d' Italie, Panouil, Panouque, Penille—; *Gujerati:* Kang, Karang—; *Hindi:* Bertia, Chena, Kakni, Kakun, Kalakangni, Kanghuni, Kangni, Kangu, Kauni, Kirakang, Kiranj, Koni, Kora, Rala, Rawla, Tangan—; *Ilocano:* Bicacao, Bucacao—; *Italian:* Panico—; *Kashmir:* Pingni, Shali—; *Konkani:* Kangu—; *Kumaon:* China, Gandra, Kangni, Koni, Mandira, Mundua, Murhoa, Shungura—; *Malayalam:* Navana, Tauna—; *Malta:* Italian Millet, Panico—; *Marathi:* Chena, Kang, Kangu, Rala, Rale—; *Mundari:* Irba—; *North-Western Provinces:* Kangni, Tangun—; *Pampangan:* Borona—; *Persian:* Arzun, Gal—; *Punjab:* Chanwal-kangni, Chiurr, Gal, Husketkangni, Kangni, Khauni, Kher, Kusht, Shak, Shali—; *Pushtu:* Gal—; *Sanskrit:* Chinaka, Kangu, Kanguni, Kangunika, Pitatandula, Priyangu—; *Santali:* Erba—; *Sind:* Kirang—; *Sinhalese:* Tanahal—; *Spanish:* Mijo menor, Panizo—; *Tagalog:* Daua, Dava—; *Tamil:* Tenai, Tennai—; *Telugu:* Kora, Koralu—; *Uriya:* Tangun—; *Visayan:* Daoa, Daua, Dava—.

2. **Setaria plicata** T. Cooke Fl. Bomb. Pres. II, 919.—*Panicum plicatum* Lam. Ill. I (1791) 171.

Perennial; stem 0.3-2.4 m. long, erect or ascending from a woody branching rootstock, stout, leafy; nodes strigillose; internodes 5-15 cm. long. Leaves 15-60 by 1.3-7.5 cm., linear-lanceolate, finely acuminate, chartaceous, glabrous or sparsely hairy, plicate between the numerous veins, base narrow; sheaths smooth or hispid, the margins naked, or ciliate near the top only; ligule of long hairs. Panicle 30-60 cm. long, contracted, nodding; rhachis stout, angular, scabrid; branches usually alternate, distant (the lower 7.5-10 cm. long), filiform, suberect, bearing short capillary few-flowered branchlets and bristle-like flowerless ones. Spikelets 3 mm. long, sessile or shortly pedicellate, ovoid, acute or apiculate, glabrous. Glumes 4; lower involucral glume broadly ovate, obtuse, 5-nerved, membranous, half as long as the spikelet; upper involucral glume rather more than half as long as the upper floral glume, ovate, obtuse, 7-nerved, membranous; lower floral glume slightly longer than the upper, ovate, shortly apiculate, membranous, empty, paleate or not, 5-nerved the palea when present small, hyaline, narrowly ovate, acute; upper floral glume crustaceous, ovate-oblong, acute or shortly apiculate, slightly transversely striate, pale-yellow, with strongly involute margins; palea ovate, acute, nearly as long as the glume, faintly transversely striate and with incurved membranous margins.

Distribution: Throughout the moister hilly parts of India, Ceylon, Malay Peninsula.—China, Malay Islands.

The plant is used in La Reunion as an emollient and diuretic.

La Reunion: Trainasse—.

3. **Setaria viridis** Beauv. Agrost. 51.

Stem 30-60 cm. high, erect or ascending, simple or branched; nodes glabrous, the lower rooting. Leaves 10-30 by 1 cm., linear, finely acuminate, flat, glabrous or sparsely hairy, with scabrid margins, base usually rounded; sheaths smooth; ligule a ridge of hairs. Spike-like panicle very interrupted. Bristles of involucel 3-6, usually short, green or reddish. Spikelets ovoid. Glumes 4: Glume I about half glume III, acute, glume II and III subequal, 5-7-nerved. Glume IV nearly smooth.

Distribution: Temperate Himalaya and W. Tibet up to 11,000 ft.. rare in the plains of India.—Temperate and subtropical regions of the Old World.

The plant, crushed and mixed with water, is used as an external application for bruises.

Chinese: Kou Wei Ts'ao—.

SORGHUM Pers.

Annual or perennial, often robust, grasses. Leaf-blades convolute in bud, usually flat, herbaceous, often large. Panicles erect or nodding with verticillate or scattered branches, often large, in the spontaneous species mostly loose, in the cultivated forms frequently variously contracted to compact. Spikelets 2-nate, those of each pair differing in shape and sex, one sessile, the other pedicelled or represented by a pedicel only, on the articulate fragile or (in cultivated forms) tough rhachis of panicled few- (sometimes 1- or, the other extreme, 6-8-) jointed racemes, the sessile spikelet falling with the contiguous joint and the accompanying pedicelled spikelet or at least its pedicel. Florets 2, lower reduced to an empty valve, upper hermaphrodite in the sessile, male or neuter in the pedicelled spikelets, if present at all. Sessile spikelet : Involucral glumes equal, coriaceous, at least when mature, rarely permanently chartaceous, muticous. Lower with a broad flattened or convex back with the margins narrowly inflexed near the tips and elsewhere involute. Upper cymbiform with narrow hyaline, usually upwards ciliate margins. Lower floral glume empty, hyaline, ciliate, 2-nerved or nerveless. Upper oblong to ovate, 1-3-nerved, 2-lobed or dentate, with the lobes free or more or less adnate to a perfect or variously reduced awn or a mucro rising from the sinus, rarely entire and mucronate or muticous. Pale hyaline, often minute or 0. Lodicules 2, ciliate or glabrous. Stamens 3. Stigmas laterally exserted; styles terminal or subterminal. Grain in the wild species mostly obovoid, dorsally compressed, in cultivated forms frequently enlarged, globose or subglobose; embryo as long or slightly longer than half the grain. Pedicelled spikelets, if present, much narrower than the sessile, lanceolate to subulate, male or neuter sometimes reduced to the glumes or one glume only or quite suppressed. Involucral glumes permanently herbaceous, awnless like the hyaline 2-1-nerved ciliate floral glumes. Species about 35.—Tropics and subtropics of both hemispheres.

1. Perennial .... 1. *S. halepense.*
2. Annual .... 2. *S. vulgare.*

S. vulgare Linn. is used medicinally in China.

1. **Sorghum halepense** Pers. Syn. I (1805) 101.—*Andropogon halepensis* Brot. Fl. Lusit. I (1804) 89.

Perennial; stems erect, tall, up to 4.5 m. high, stout, simple or sparingly branched, glabours, leafy; nodes minutely silky. Leaves 30-60 by 2-5 cm. linear-lanceolate, tapering to a fine point, glabrous, smooth, margins scabridly serrulate, midrib stout, base narrowed or sometimes rounded; sheaths glabrous, striate; ligule short, membranous, ciliate. Panicle 15-45 cm. long, decompound; rhachis nearly smooth; branches mostly alternate, suberect, filiform, the lower branches up to 20 cm. long or more, the axils often bearded; recemes 1.3-2.5 cm. long, oblong; joints 3-7, more than 1/2 as long as the sessile spikelets, more or less ciliate; pedicels similar. Sessile spikelets 4-5 mm. long, ovoid-lanceolate, dorsally compressed, green or purplish; callus small, shortly bearded. Glumes 4; lower involucral glume subchartaceous, ovate, acute, convex, more or less silky-hairy, 5-13-nerved, with involute margins; upper involucral glume as long as the lower, lanceolate, acuminate, chartaceous, shining, 5-7-nerved; lower floral glume almost as long as the upper involucral glume, elliptic-oblong, obtuse, hyaline, ciliate; upper floral glume 2 mm. long, oblong, 2-lobed, hyaline, ciliate; awn 13 mm. long, sometimes reduced to a bristle or suppressed. Pedicellate spikelets about as long as the sessile but much narrower, not awned, male or barren; lower involucral glume herbaceous, 5-9-nerved, glabrous, the keels ciliate; upper involucral glume similar, 3-5-nerved; lower floral glume as in the sessile spikelets; upper floral glume linear-oblong, hyaline.

Distribution: Most warm countries.

The seeds are demulcent and diuretic.

Banda: Bajra, Bara, Barru—; *Bengal:* Kalamucha—; *Berar:* Kartal—; *Bhabar:* Buru, Rikhon—; *Ceylon:* Johnson-weed, Sorghum-weed—; *Chanda:* Gallajari, Gudi Paddajalla—; *Hindi:* Baru—; *French:* Herbe de Para—; *Kashmir:* Braham—; *Kohlu:* Baran—; *Kumaon:* Bikhonda—; *Malta:* Alleppo Millet grass, Cannarecchia, Dente cavallino—; *Merwara:* Bowari—; *Punjab:* Baru, Barwa, Braham—; *Pushtu:* Barua—; *Sakalave:* Fembamboloky—; *Shahrig:* Baran—; *South Africa:* Cuba Grass, Johnson Grass—; *Telugu:* Gaddijanu—; *United States:* Cuba Grass, Johnson Grass, Mean's Grass—.

2. **Sorghum vulgare** Pers. Syn. I (1805) 101.—*Andropogon Sorghum* Brot. Fl. Lusit. I (1804) 88.

A stout usually tall annual with broadly linear leaves with a prominent white midrib and a usually thyrsiform decompound panicle with crowded whorls of erect branches and branchlets, rarely sub-effuse. Rhachis of spike tenacious, joints leaving a ragged scar at the tip when forcibly separated. Pedicelled spikelets usually neuter, pedicels short.

Distribution: Widely cultivated in India.

The grain is cooling, aphrodisiac; indigestible constipating; improves appetite and taste; useful in "kapha", biliousness, diseases of the blood, piles, ulcers, tumours (Ayurveda).

The seeds are diuretic and demulcent.

American Negroes take the decoction of the seeds as a remedy for urinary, bladder and kidney complaints.

Afghanistan: Jaor, Jaoriturkimani, Jawars, Jowar, Kiosagi—; *Arabic:* Dakkn, Dhura, Dhurat, Jawars, Taam, Zura—; *Ashanti:* Atokoor—; *Babian Shahrig:* Jowari, Targhar—; *Baghwana:* Dhutar. Turi—; *Bengal:* Jowar, Juar, Kasajonar, Kurbi—; *Betsileo:* Variampemby, Varifemba—; *Bhabar:* Junali—; *Bombay:* Jaundri, Joar, Jondla, Jowari, Kangra—; *Burma:* Pyoung—; *Canarese:* Jolah, Kenjol, Nirgol, Shalu, Yengara—; *Catalan:* Melca, Menca, Mill africa—; *Central Provinces:* Jowar, Phag, Thuthera—; *Ceylon:* Cholum, Durra, Great Millet, Guinea Corn—; *Chinese:* Kao Liang, Shu Shu—; *Deccan:* Jondla, Jowari—; *Egypt:* Durra, Kaydi—; *English:* Broom-corn, Guinea Corn, Great Millet, Indian Millet—; *Ewe:* Fo—; *French:* Balai, Balai de jonc, Balai d' eau, Blé de Guinée, Houqiue à balais, Maïs de Guinée, Mil d' Italie, Mil d' Inde, Millet d' Afrique, Millet à balais, Grand Millet noir, Millet de Turquie, Gros mil, Mil d' Ethiopie, Sorgho, Sorgho d' Afrique, Sorgho ă balai, Sorgho commun—; *Ga:* Akoko—; *Gambia:* Bassiqui, Bassiwulima, Kous, Manio—; *German:* Moorhirse, Sorghum—; *Gold Coast:* Guinea Corn—; *Gujerati:* Jowar, Juar, Sundia—; *Hindi:* Janera, Joar, Jondla, Jowari, Juar, Jundri, Juvarijondhla, Kanggni—; *Hova:* Ampemby—; *Konkani:* Juar—; *Krepi:* Fo—; *Krobo:* Koko—;

Kumaon: Jowar, Junali—; *Languedoc:* Millangue, Millanque—; *Las Bela:* Jowari—; *Makran:* Mohammadisa, Sohro—; *Malayalam:* Chavela—; *Malta:* Dari-seed, Durrah, Karabocc, Melica, Saggiwa—; *Marathi:* Jondhala, Juari, Kadval, Shalu—; *Mundari:* Ganggai—; *North-West Provinces:* Bajrajhopanwa, Chotijuar, Juar, Junri—; *Oudh:* Bajrajhopanwa, Chotijuar, Juar, Junri—; *Portuguese:* Milho—; *Punjab:* Bajrajhupanwa, Chari, Chotijuar, Chotijunri, Joar, Junri, Ka—; *Russian:* Sorgo—; *Sakalave:* Bakaka, Morama—; *Sanskrit:* Dirghamala, Dirghashara, Ikshupatraka, Kshetrekshu, Raktakhumah, Shikhari, Vrittatandula, Yavanala—; *Sarakhala:* Tarighara—; *Sinhalese:* Karaliringu—; *South Africa:* Kaffir Corn, Kafir Corn—; *Spanish:* Alcandia, Saina—; *Tamil:* Cholam—; *Telugu:* Bondajanu, Janu, Jonna, Jonnalu, Kondajanu, Tellajanu—; *Twi:* Atoko, Awi, Kokorte—; *Visayan:* Batad—; *Zulu:* Amabele, Imfe—.

BAMBUSA Schreb.

Shrubs or trees usually large and cæspitose (rarely climbing); stem-sheaths broad, the blade often traingular. Leaves shortly petiolate, not tessellate by nervules but sometimes so by pellucid glands; sheaths variously auricled. Spikelets 1-flowered, usually arranged in a large leafless panicle bearing heads or spiciform branches, or in leafy panicles, or in paniculate spikes. Lower glumes 1-4, empty or bulbiferous; flowering glumes ovate-lanceolate, the uppermost imperfect; palea 2-keeled. Lodicules 2 or 3, membranous, ciliate, rarely obsolete. Stamens 6, free. Ovary oblong or obovoid, with a hairy tip; styles short or long; stigmas 2-3. Grain oblong or linear-oblong, furrowed on one side; pericarp thin, adherent to the seed.—Species 73.—E. Asia, Australia.

B. arundinacea Retz. is used medicinally in Malaya and Guiana; *B. barbata* Trin., *B. capitata* Willd. in Madagascar.

1. **Bambusa arundinacea** Retz. Obs. V (1789) 24 (sub. *Bambos*).—PLATE 1024.

Thorny; stems many, tufted on a stout rootstock, 24-30 m. high by 15-18 cm. diam., usually graceful and curving; nodes prominent (the lowest rooting), the lower emitting horizontal, almost naked shoots armed at the nodes with 2-3 stout recurved spines sometimes 2.5 cm. or more long; internodes up to 45 cm. long; walls 2.5-5 cm. thick; stem-sheaths coriaceous, variable in shape, up to 30-38 by 23-30 cm., striate, with rounded tip and plaited margins, when young orange-yellow streaked with green or red and thickly ciliate with golden hairs, blade up to 10 cm. long, triangular, acuminate, glabrous outside, densely hirsute inside the margins decurrent, thickly ciliate; ligule narrow, entire or fringed with pale hairs. Leaves up to 18-20 by 2.5 cm., linear or linear-lanceolate, tip stiff, glabrous or puberulous beneath, one or more margins scabrous, base rounded, ciliate, midrib narrow, nerves 4-6 with 7-9 intermediate and a few transverse pellucid glands; leaf-sheath ending in a thick callus and shortly bristly auricle; ligule short. Inflorescence an enormous panicle often occupying the whole stem; branchlets bearing loose clusters of pale, suberect, lanceolate, acute, glabrous spikelets 1.3-2.5 cm. by 5 mm. Involucral glumes 2 or 0, ovate-lanceolate, acute or mucronate, 5-8 mm. long, many-nerved, empty; floral glumes 3-7, the uppermost 1-3 male or neuter; palea subacute with 2 ciliate keels. Lodicules 3, ovate or subovate, hyaline, ciliate, 1-3-nerved. Anthers yellow, obtuse. Style short. Grain 5-8 mm. long, oblong, beaked by the style-base, grooved on one side.

Distribution: India, Burma, Ceylon. Often cultivated.

The stem and leaves are sour, acrid, bitter; cooling, laxative; useful in " kapha ", burning sensations, diseases of the blood, biliousness, leucoderma, inflammations, strangury, wounds, piles.—The sprouts are pungent, acrid; laxative; useful in strangury; cause burning sensation and increase cough.—The seeds are acrid, sweet; fattening, aphrodisiac, alexiteric; useful in biliousness, urinary discharges.—The manna is sweet, cooling, acrid, with a flavour; tonic, aphrodisiac; constipating; useful in diseases of the blood, tuberculosis, bronchitis, asthama, fevers, leprosy, jaundice, anæmia, strangury, burning sensations (Ayurveda).

The root is tonic; burnt and applied to ringworm, bleeding gums, joint pains.—The leaves are emmenagogue; good as an eye wash;

lessen bronchitis, lumbago, piles, biliousness, gonorrhœa, fever.—The juice of the flower dropped in the ear for earache and deafness.—The manna has a bad taste; useful in burning sensations, biliousness, thirst, ophthalmia, fevers, stomatitis; the burnt powder is useful in syphilis, thirst, fever, stomatitis, but is constipating (Yunani).

The leaves are used with black pepper and common salt to check diarrhœa in cattle. A decoction of the leaf-bud is a good emmenagogue.

In the Tamil country; the root is considered diluent; the bark is used as a cure for eruptions; the leaves are used as emmenagogue; the tabashir is given in paralysis and flatulence.

Tabashir is generally given in fever to assuage thirst; it is used also as an expectorant.

The most efficacious application for dislodgment of worms in ulcers is a poultice made by pounding the young shoots of the bamboo. The juice is first poured on the vermin, and the ligneous mass is applied and secured by a bandage.

The leaves are used as an emmenagogue in China.

The bark, seeds and manna are equally useless in the antidotal treatment of either snake-bite (Mhaskar and Caius) or scorpion-sting (Caius and Mhaskar).

Annam: Tre, Tre pheo—; *Arabic:* Qasab—; *Assam:* Bnah, Kata, Koto—; *Bengal:* Bans, Behurbans—; *Bombay:* Dougi, Kalak, Mandgay, Padhai—; *Burma:* Kyakatwa—; *Canarese:* Bambu, Bidaru, Bidiru, Bidirumale, Bidru, Bidungulu, Biduru, Elubidiru, Gale, Hobbidiru, Hebbidru, Hennubidiru, Kalale, Karira—; *Cantonese:* T' in Chuk Wan, T' in Chuk Wong—; *Catalan:* Bambu—; *Central Provinces:* Kattang—; *Chinese:* T' ien Chu Huang, T' ien Chu Yuen—; *Chittagong:* Bariala—; *Deccan:* Bambu, Bhans, Chansa—; *English:* Spiny Bamboo, Thorny Bamboo—; *French:* Bambou, Bambou commun, Canne bambou—; *French Guiana:* Bambou—; *Garo:* Whahkanteh—; *German:* Bambus—; *Gond:* Katiwadur—; *Gujerati:* Toncor, Wans—; *Haldwani:* Kanwas—; *Hasada:* Katanggarimad—; *Hindi:* Bans, Kantabans, Kattang, Magarbans, Malbans—; *Italian:* Bambu, Canna indiana—; *Java:* Singkara—; *Kadir:* Mula, Mulai—; *Kolami:*

Katanga—; *Konkan:* Kalak, Padhai—; *Konkani:* Conoqui, Kananki, Vellu—; *Kumaon:* Kantabans—; *Lambadi:* Bambu—; *Languedoc:* Boulou—; *Madras:* Ponteveduru—; *Magahi:* Wanah—; *Malaya:* Thian chook wong—; *Malayalam:* Illi, Kampu, Kaniyaram, Karmmaram, Mula, Mulmulam Pattil, Tejanam, Trinadhvajan, Valiyamula, Venu—; *Marathi:* Kallak—; *Naguri:* Katangmad—; *Panch Mahals:* Vas—; *Persian:* Nai—; *Portuguese:* Bambu espinhoso, Spodio—; *Punjab:* Magae, Nal—; *Roumanian:* Bambu—; *Russian:* Bambuk—; *Sanskrit:* Bahupallava, Brihattrina, Dhanurdruma, Dhatushya, Dridhagranthi, Dridhakanda, Dridhapatra, Duraruha, Kamatha, Kantaki, Kantalu, Karmmara, Kichaka, Kilati, Kishkuparva, Kushirandhra, Mahabala, Maskara, Mrityubija, Navagragandha, Phalantaka, Purvayoni, Pushpaghataka, Shataparva, Shatpadalaya, Suparva, Suparvan, Tajana, Tejana, Trinadhvaja, Trinaketu, Trinaketuka, Tvachisara, Tvakasara, Vadaniya, Vansha, Vanya, Venu, Yavaphala—; *Santali:* Mat—; *Sinhalese:* Kattuuna, Una—; *Spanish:* Bambu, Cana de Indias para bastones, Mambu—; *Tagalog:* Canayangtotoo—; *Tamil:* Ambal, Ambu, Aril, Bongu, Iraivarai, Kalai, Kambul, Kilai, Kisagam, Kuluaimungil, Masukkaram, Miruttusam, Mudangal, Mulai, Mullumungil, Mundlaveduru, Mundul, Mungil, Nadimungil, Nedil, Nettil, Palandam, Panai, Pandil, Pasy, Perumungil, Peruvarai, Sabam, Sanagi, Sey, Tandu, Tattai, Tulai, Tumbu, Valai, Vannigaruppam, Varaimungil, Vedir, Velam, Venu, Veral, Vey, Veyal, Vindil—; *Telugu:* Bongu, Bonguveduru, Kichakamu, Maskaramu, Mudusuveduru, Pentiveduru, Trinadhvajamu, Veduru—; *Thana:* Kalak, Katestokar, Padai—; *Tongking:* Tregai—; *Tulu:* Bedru—; *Upper Godavery:* Kanka—; *Urdu:* Bansa—; *Uriya:* Beudobaunso, Kontabanso, Kontabaunso—.

DENDROCALAMUS Nees.

Arborescent unarmed bamboos with densely branching rootstocks. Leaves shortly petiolate, the transverse nervules represented by pellucid glands. Spikelets in globose clusters on the long branches of a compound panicle, ovoid, 2-6-flowered. Involucral glumes 2-3, empty, ovate, acute, many-nerved; floral glumes like the empty;

palea of lower florets keeled, of the upper dorsally rounded, eciliate. Lodicules rare. Stamens 6; filaments free. Ovary hairy above, often depressed; stigma usually simple. Grain small; pericarp coriaceous or crustaceous.—Species 24.—Indo-Malaya, Philippines, China, Africa.

The genus is therapeutically inert.

1. **Dendrocalamus strictus** Nees in Linnæa IX (1834) 476. —PLATE 1025.

A deciduous densely tufted bamboo with strong stems 6-15 m. high by 2.5-7.5 cm. diam., which are solid or only with a small cavity, glaucous-green when young, dull green or yellowish when old; nodes swollen, the lower often rooting; internodes 30-45 cm. long; upper branches decurved; stem-sheaths variable, the lower 7.5-30 cm. long, covered on the back with golden brown stiff hairs (or in dry localities sometimes glabrous), striate, rounded on the top, ciliate on the margins, very slightly auricled, the imperfect blade triangular-subulate, hairy on both sides, especially so within; ligule narrow. Leaves 2.5-5 cm. long in dry localities, up to 25 cm. long in moist ones, 0.6-3.2 cm. broad, rounded suddenly at the base into a short petiole, gradually narrowed upwards into an acuminate twisted point, rough and often hairy above, softly hairy beneath, with scabrous margins; nerves 3-6 pairs, with interposed pellucid glands; leaf-sheaths striate, hairy, callus prominent, auricle short, ciliate with a few wavy deciduous hairs; ligule narrow, serrate. Inflorescence a large branching panicle of dense globular heads about 2.5 cm. diam., 3.8-5 cm. apart; rhachis rounded, smooth. Spikelets usually hairy, spinescent, the fertile intermixed with many sterile smaller ones, 8-13 by 2.5-5 mm., with 2-3 fertile florets. Involucral glumes 2 or more, ovate, spinescent, many-nerved; floral glumes ovate, ending in a sharp spine, surrounded by siliate tufts of hairs; palea ovate or obovate, emarginate, the lower ones 2-keeled, the uppermost keelless, 6-8-nerved. Stamens long-exserted; anthers yellow, shortly apiculate. Ovary stipitate, turbinate; style long; stigma simple, plumose.

Grain 8 mm. long, ovoid to subglobose, brown, shining, hairy above, beaked with the persistent style-base.

Distribution: India, Java.

The silicious matter found near the joints is used as a cooling, tonic and astringent medicine. The leaves are given to animals during parturition, from a supposition that they cause a more rapid expulsion of the placenta.

Baigas: Bhiru —; *Bengal:* Karail—; *Bombay:* Bas, Bassa, Kaban, Udha, Vassa—; *Burma:* Myinwa—; *Canarese:* Bidiru, Gandubediru, Kibbidary, Kiribidiru—; *English:* Male Bamboo, Solid Bamboo—; *Gond:* Halpa, Vadur, Veddar—; *Gujerati:* Nakorvans, Narvans, Vans—; *Hindi:* Bans, Banskaban, Banskhurd, Kopar, Lakdibans, Narbans—; *Khond:* Maringi—; *Kolami:* Burumat, Mathan, Saring—; *Kumaon:* Bans—; *Kurku:* Indo—; *Lambadi:* Vasi—; *Malayalam:* Arinkantam, Cheriyamula, Kalmula, Karinalimula, Karinkana—; *Marathi:* Bans, Bharivel, Bhovarlit, Velu—; *Mundari:* Birmad, Burumad—; *Palamow:* Bukhar—; *Pandratola:* Kark—; *Reddi:* Kondaveduru—; *Sanskrit:* Vansha, Venu, Yavaphala—; *Santal:* Burumat—; *Saora:* Kondaveduru—; *Tamil:* Karanai, Kalmungil, Kattumungil, Mungil, Sinnamungil, Sirumungil, Siruvari—; *Telugu:* Chittiveduru, Gattiveduru, Kankaveduru, Potuveduru, Rativeduru, Sadanapuveduru, Sannaveduru, Veduru—; *Thana:* Bundi, Manwel—; *Tulu:* Lavakiri, Panjibedru—; *Uriya:* Salimbobaunso, Sanobaunso—.

INDIAN MEDICINAL PLANTS

CRYPTOGAMIA.

FILICES.

Herbs, rarely shrubs or trees; stock short or long, erect or creeping, often scaly; fronds simple or variously, often much, lobed or cut; in bud usually circinate, very rarely erect. Sporangia 1-celled, usually membranous and dorsal, rarely marginal, surrounded by a complete or incomplete jointed elastic ring, sometimes with the ring confined to the apex of the capsule so as to form a longitudinally striated crown, opening vertically; rarely the ring obsolete or absent; the sporangia clustered in sori of defined but varied form, with or without a covering indusium; occasionally the sporangia spicate or paniculate, rarely laxly scattered; sometimes the sporangia sunk in a many-celled, fleshy or corky receptacle of variable form, opening by pores or clefts on the upper surface. Spores minute, variable in form, all of one kind.

I. *Dicksonieæ.*—Sori globose; indusium inferior, subglobose, free, closed, at length bursting irregularly, more frequently cup-shaped, entire or with 2 lips
  Indusium apical on a vein 2-valved .... CIBOTIUM.

II. *Davalliæ.*—Indusium squamiform, suborbicular or tubular, open at the apex
  Indusium apical, compound, suborbicular, only open at the top .... STENOLOMA.

III. *Pterideæ.*—Indusium oblong or linear, formed of the more or less changed and reflexed margin of the frond, opening inwardly
  a. Indusium globose to linear, usually many and distinct, sometimes confluent and continuous bearing the capsules on its under side; veins free .... ADIANTHUM.
  b. Indusium rounded and distinct, or more or less confluent but not continuous; capsules on the frond .... CHEILANTHES.
  c. Indusium quite continuous; sori linear continuous, occupying a slender filiform receptacle in the axis of the indusium; veins free .... PTERIS.

IV. *Asplenieæ.*—Indusium linear or oblong or horseshoe-shaped, opening towards the midrib, sometimes double; sori attached to the veins
  a. Indusium linear or oblong, single; veins free .... ASPLENIUM.
  b. Indusium linear or oblong, more or less curved .... ATHYRIUM.
  c. Indusium linear, elongated, submarginal; fronds fan-like .. ACTINIOPTERIS.

V. *Aspidieæ.*—Indusium superior, elliptical, subglobose or reniform fixed either by the centre or a sinus
  Indusium peltate, orbicular or reniform; veins copiously anastomosing with free included veinlets .... ASPIDIUM.

VI. *Polypodieæ.*—Sori on the back of the lobes, round or rarely somewhat oblong
  a. Fronds either with the base oak-leaf-like or with separate sterile oak-leaf-like small fronds .... DRYNARIA.
  b. Fronds various; veins copiously anastomosing with free included veinlets .... PLEOPELTIS.

VII. *Osmundaceæ.*—Capsules 2-valved, opening across the apex, furnished with a short horizontal ring .... OSMUNDA.

VIII. *Schizæaceæ.*—Capsule 2-valved, opening down the side crowned by a complete operculiform ring
  Capsule solitary in the axils of large imbricating clasping involucres. Scandent .... LYGODIUM.

XI. *Ophioglossaceæ.*—Capsules deeply 2-valved, opening down the side nearly to the base without a ring
  a. Capsules sessile in 2 rows on a narrow close spike ...... OPHIOGLOSSUM.
  b. Capsules in small crested clusters forming a loose spike .. HELMINTHOSTACHYS
  c. Capsules in 2 rows on the face of spikes which form a compound panicle .... BOTRYCHIUM.

Rhizome amylaceous, bitter, astringent, febrifuge, and vermifuge; frond aromatic, mucilaginous, astringent, and bechic.

OFFICIAL :—*Adiantum Capillus-Veneris* Linn. in Belgium, Portugal, Switzerland, Turkey; *A. pedatum* Linn. in France.

Aspidium Filix mas Swartz in Denmark, France, Holland, Hungary, Norway.

Cibotium Baromez J. Sm. and other Species in Austria.

Dryopteris crassirhizoma Nakai in Japan; *D. filix mas* Schott in Belgium, Great Britain, Japan, Sweden; *D. filix mas* (Linn.) Schott in Germany, Great Britain, Turkey, United States; *D. Fillix mas* L. Schott=*Aspidium Fillix mas* L. Swartz in Russia.

Nephrodium Filix mas Michaux=*Aspidium Filix mas* (Linne) Swartz in Switzerland.

Polypodium Filix mas Linn.=*Nephrodium Filix mas* Rich. or *Polystichum Filix mas* Roth. in Portugal.

Polystichum Filixmas Roth.=*Polypodium Filix mas* Linn. in Spain; *P. Filix mas* Roth.=*Nephrodium Filix mas* Richard; *Aspidium Filix mas* Swartz, *Dryopteris Filix mas* Schott in Italy.

Scolopendrium officinale Linn. in France.

POLYPODIACEAE.

Herbs, rarely trees; caudex erect or creeping; fronds herbaceous or coriaceous, rarely membranous; vernation circinate. Sori dorsal or marginal, with many sporangia, included or not in a covering indusium, usually pedicelled, more or less completely surrounded by a jointed, vertical elastic ring, and usually bursting transversely.—Genera 150. Species 3,000.—Cosmopolitan, rare in dry regions.

Rhizome astringent, styptic, febrifuge, vermifuge; frond emollient, pectoral, expectorant.

CIBOTIUM Kaulf.

Sori at the apex of a vein, intramarginal; indusium distinctly 2-valved, the outer valve coriaceous, distinct from the substance of the frond; veins free, simple, forked, or pinnate; arborescent, with large decompound coriaceous fronds.—Species 10.—Tropical America, Polynesia, Asia.

C. barometz Link. is used medicinally in China, Indo China, Malaya.

The filaments of *C. Baromez* J. Sm. and other species are officinal in Austria.

1. **Cibotium barometz**(Link.).—*C. glaucum* Bedd. Ferns of Brit. India t. 83.

Arborescent; fronds tripinnate, lower pinnæ ovate-lanceolate, 30-60 cm. long, 15-30 cm. broad; pinnules linear-acuminate, cut down within a short distance of the rhachis above, and sometimes quite down to it at the base, segments linear-oblong, acute, subfalcate, upper surface naked, shining, lower glaucous, sometimes furfuraceous; sori 2-12 to a lobe; the valves nearly equal, transversely oblong.

Distribution: Mishmi, Assam, Tavoy.—Malay Islands, S. China.

The root is employed in China as a tonic, and is said to exercise a special action on the genito-urinary organs. It is also given for lumbago.

In Annam, the stems are considered tonic and styptic. The rhizome, like other fern roots, is used as a vermifuge.

The golden brown hair is used in Malaya for stanching wounds.

Annam: Cau quyet, Cau tich, Cay cu lan, Cay cu li, Cay cu lon, Cay Ku lien, Kim Mao—; *Cantonese:* Kau Tsek—; *Chinese:* Kou Chi—; *French:* Agneau de Scythie, Agneau de Tartarie, Chien roux—; *Malaya:* Kow chiak—.

STENOLOMA Fée.

Fronds bi-tripinnatifid, ultimate segments cuneiform, growing gradually wider from the base to the apex; veins dichotomously forked, venules free; indusium terminal on the segments, forming a compressed suborbicular, or cup-shaped pouch, only open at the top; rhizome creeping; stipes tufted, not articulated upon the rhizome.

S. chinensis Bedd. is used medicinally in China and Mauritius.

1. **Stenoloma chinensis** Bedd.—*Davallia tenuifolia* Hook.; Bedd. Ferns of S. India, t. 16.

Rhizome stout, densely fibrillose; stipes strong, erect, polished, naked, dark brown, 15-30 cm. long; fronds 30-45 cm. long, 15-23 cm. broad, ovate, 4-pinnatifid; lower pinnæ ovate-lanceolate, 10-15 cm. long, 5-7.5 cm. broad; pinnules lanceolate, their segments cut down to the rhachis below, with toothed cuneate lobes, 2-3 mm. across at the apex; texture subcoriaceous, both surfaces naked, the upper shining; sori terminal, usually solitary, often rather broader than deep.

Distribution: Madras Presidency, Western Mountains 3,000—6,000 ft., Himalayas, Kumaon to Bhutan 1,000—4,000 ft., Khasia, Ceylon, Malay Peninsula.—China, Japan, Polynesia, E. African Islands.

Administered internally for chronic enteritis in Mauritius.

Chinese: Wu Chiu—; *English:* Parsley Fern—; *Mauritius:* Petite fougere—.

ADIANTUM Linn.

Sori marginal, varying in shape from globose to linear, usually numerous and distinct, sometimes confluent and continuous; indusium of the same shape as the sorus, formed of the reflexed margin of the fronds, bearing the capsules on its under side; veins free.—Species 190.—Cosmopolitan, especially tropical America.

Astringent and tonic, demulcent and pectoral, diaphoretic and emmenagogue.

The following species are used medicinally in Europe, Indo China, Mexico—*A. capillus-veneris* Linn.—; in China—*A. capillus-veneris* Linn., *A. flabellulatum* Linn., *A. monochlamys* Eat.—; in North America—*A. pedatum* Linn.—; in Brazil—*A. cuneatum* Langsd. and Fisch., *A. radiatum* Linn., *A. subcordatum* Sw., *A. tenerum* Sw.—; in South Africa and La Reunion—*A. capillus-veneris* Linn., *A. æthiopicum* Linn.—.

OFFICIAL :—The fronds of *A. pedatum* Linn. in France; *A. capillus-veneris* Linn. in Belgium, Portugal, Switzerland, Turkey.

1. **Adiantum lunulatum** Burm.; Bedd. Ferns of S. India. t. 1. —PLATE 1031.

Stipes 10-15 cm. long, tufted, wiry, naked, polished dark chestnut-brown; fronds 15-30 cm. long and 7.5 cm. broad, simply pinnate, often elongated and rooting at the apex; pinnæ subdimidiate, the lower edge nearly in a line or oblique with the petiole, the upper edge rounded and like the bluntly rounded sides usually more or less lobed; petioles of the lower ones spreading 6-13 mm. long, texture herbaceous; the rhachis and both surfaces naked; sori in continuous lines along the edge.

Distribution: Throughout N. India in moist places, S. India very general on the W. side in the plains and lower slopes of the hills, Ceylon, Burma.—In the tropics of nearly the whole world.

The root is good for strangury and for fever due to elephantiasis.—The plant is pungent, cooling; alterative, alexiteric; indigestible; useful in dysentery, diseases of the blood, ulcers, erysipelas, burning sensations, epileptic fits (Ayurveda).

In Gujarat, it is extensively used in the treatment of children for febrile affections. The leaves are rubbed with water and given with sugar. It is worked up with ochre and applied locally for erysipelatous inflammations.

Bengal: Goyalelata, Kalijhant—; *Bombay:* Hansraj, Hansaraj, Mubarak, Rajahans—; *Canarese:* Navalad—; *Gujerati:* Hanspadi, Hansraj, Mubarkha, Mubarkhinipalo—; *Hindi:* Hansapadi, Hansapagi, Kalijhamp, Kalijhant, Paresiyavasan—; *Ilocano:* Dalipaco—; *Marathi:* Ghodkhuri, Hansraj, Kamsaraj, Rajhans—; *Philippines:* Culantrillo—; *Porebunder:* Hansraj, Kalohansraj—; *Sanskrit:* Brahmadani, Chitrapada, Dharttarashtrapadi, Ghritamandalika, Godhangri, Godhapadika, Hansaghri, Hansapadi, Hansavati, Karnati, Kiramata, Kirapadika, Kitamari, Madhusrava, Padangi, Raktapadi, Sancharini, Shitangi Sutapadika, Suvaka, Tamrapadi, Tridala, Tripadi, Triphala, Vikranta, Vishvagranthi—; *Tagalog:* Caicai, Gayomanmanoc, Lamotlamotan, Lomotlomotan—.

2. **Adiantum caudatum** Linn.; Bedd. Ferns of Brit. India, t. 2.—PLATE 1029.

Stipes 5-10 cm. long, tufted, wiry, spreading, dark chestnut-brown, tomentose; fronds 15-30 cm. long, simply pinnate, often elongated and rooting at the extremity, pinnæ 13-20 mm. long, 6 mm. deep, dimidiate, nearly sessile, the lower line straight and horizontal, the upper rounded, more or less cut, often deeply and repeatedly, the point usually blunt, the lower ones slightly stalked; texture coriaceous; the veins prominent; the rhachis and both surfaces of the frond villous; sori roundish or transversely oblong on the edge of the lobes.

Distribution: Throughout India, Ceylon, and the Malay Peninsula, in the plains and lower slopes of the hills.—S. China, tropical Africa, Malay Islands, Java, Mauritius, Cape Verde Islands.

The leaves are used as a cure for cough and fever. They are employed externally as a remedy for skin diseases.

Cutch: Mayurshika—; *Punjab:* Adhsaritakajhari, Gunkiri—; *Sanskrit:* Mayurashikha—.

3. **Adiantum capillus veneris** Linn.; Bedd. Ferns of S. India, t. 4.—PLATE 1028.

Stipes suberect, rather slender, 10-23 cm. long, polished, blackish, naked; fronds bipinnate, with a short terminal pinna and numerous erect-patent lateral ones on each side, the lowest slightly branched again; segments 1.3-2.5 cm. broad, the base cuneate, the outer edge rounded, deeply lobed from the circumference in the direction of the centre, and the lobes again bluntly crenated, lowest petioles 6 mm. long, texture pellucid-herbaceous, thin; rhachis and both surfaces naked; sori roundish or obreniform, placed in the roundish sinuses of the crenations.

Distribution: Madras Presidency, west side, up to 5,000 ft. on the mountains, Ceylon, N. India.—Europe, Africa, America and Australia.

In the Punjab, the leaves along with pepper, are administered as a febrifuge, and in South India, when prepared with honey, they are used in catarrhal affections.

At Colomas (Mexico), this plant is used as a tea to relieve colic, but at Colothan it is taken as a tea for amenorrhea.

The herb is mucilaginous, pectoral, expectorant; and is used as a popular cough medicine throughout most parts of Europe. It has also been used as an emmenagogue.

In France, large quantities are employed in the preparation of "Sirop de Capillaire." It may be used in all coughs, throat affections, and bronchial disorders.

The Sutos smoke the leaf for head and chest colds.

Arabic: Shairuljin, Shiruljin—; *Catalan:* Capillera, Falsia—; *Dutch:* Venushaar, Vrouhenhaar—; *English:* Maidenhair Fern, Maria's Fern, Our Lady's Hair—; *French:* Adiante, Adianthe, Capillaire, Capillaire commun, Capillaire d'Italie, Capillaire de Montpellier, Capillaire vrai, Cheveux de Venus—; *German:* Frauenhaar, Venushaar—; *Greek:* Adianton—; *Gujerati:* Hanspadi—; *Hindi:* Hansraj, Mubaraka, Pursha—; *Italian:* Adianto, Capelvenere, Capillare, Capilvenere—; *Kashmir:* Dumtuli—; *Kumaon:* Mubaraka—; *La Reunion:* Capillaire—; *Malta:* Maidenhair, Capelvenere, Tursin il Bir—; *Persian:* Sirsiapeshane—;

Portuguese: Avenca, Cabellos de Venus, Capillaria, Herva capillar—; *Roumanian:* Chica-voinicului, Perul fetei, Perul sfantei Marri, Vergura invelita—; *Russian:* Adiant, Krasnyi jenskiy volos—; *Salt Range:* Parasigavashan, Parshavarsha—; *Spanish:* Capilera Capilera de Mompeller, Culantrillo de pozo—; *Suto:* Pata-lewana, Pata-mawa—; *Trans-Indus:* Bisfaif, Kirwatzei—; *Turkish:* Baldirikara—.

4. **Adiantum aethiopicum** Linn.; Bedd. Ferns of S. India, t. 5;—*A emarginatum* Bedd. Ferns of Brit. India t. 18.

Stipe 15-23 cm. long, rather slender, erect, dark chestnut-brown, polished, naked; fronds up to 45 cm. long, 15-23 cm. broad, deltoid in outline, 3-4-pinnate; lower pinnules 7.5-10 cm. long, 5-7.5 cm. broad, deltoid; ultimate segments 6-13 mm. across, suborbicular, straight or subcuneate or rounded at the base, the upper part broadly not deeply lobed; texture thinly pellucid-herbaceous; rhachis and surfaces naked; sori in several roundish or transversely oblong patches in rounded hollows of the outer edge.

Distribution: N. Kanara, Nilgiris and Pulneys, at the higher elevations, Ceylon.—Australia, New Zealand, America, Africa, E. African Islands.

An infusion is used as an emollient in coughs and diseases of the chest.

In Basutoland, a decoction of the caudex is used to promote parturition. The Natives smoke the leaf for colds in the head and chest.

Afrikaans: Vrouehaar—; *South Africa:* Large Maidenhair—; *Suto:* Maorumetsoo, Pata-lewana, Pata-mawa—.

5. **Adiantum venustum** Don.; Bedd. Ferns of Brit. India t. 20.

Fronds 3-4-pinnate; pinnules firm, membranaceous-chartaceous, glabrous, and slightly glaucous beneath, shortly petiolulate obovate-cuneate, rarely subrhomboid-acuminate, striated, the superior margin rounded, scarcely ever or but slightly 2- or 3- lobed, finely dentate-serrate, fertile lobes with 2, rarely 3 notches, each notch bearing a rather large sorus at the bottom; involucres reniform-cordate, submembranaceous; stipes and slender rhachis everywhere ebeneous-glossy, glabrous.

Distribution: N. E. Himalayas, 3,000—10,000 ft.—Afghanistan.

The leaves are slightly bitter; resolvent, deobstruent, expectorant, diuretic, emmenagogue, purgative, aphrodisiac; useful in biliousness, phlegmatic humours, inflammations, diseases of the chest, ophthalmia, hydrophobia, tumours, colds, headache.—The oil is applied to piles and tuberculous glands and wounds, also to bring out a thorn which has penetrated into the body (Yunani).

It possesses astringent and aromatic properties, is emetic in large doses, and is a tonic and a febrifuge and expectorant.

In Chumba, it is pounded and applied to bruises, etc. and the plant appears to supply in the Punjab most of the officinal *hansraj*, which is administered as an anodyne in bronchitis, and is considered diuretic and emmenagogue.

The plant is very useful as a mild tonic, especially during convalescence from fevers. A vapor bath medicated by a decoction from this plant is regarded useful in fever. It is resolvent, and also used for the prevention of hair from falling.

No part of the plant is an antidote to scorpion-venom (Caius and Mhaskar).

Arabic: Kuzburatelbir, Masifelaswad, Sakelasward, Shaerelfual, Shaereljibal, Shiruljibal, Shiruljinn—; *Bombay:* Mubarak—; *Hindi:* Hansraj, Kalijhanp, Kalijhant—; *Persian:* Hansraj, Paresiyawashan, Parsiawashan—; *Sanskrit:* Hansapadi—; *Tamil:* Mayirsikki—; *Urdu:* Mobarkha, Parsia ushan—.

6. **Adiantum pedatum** Linn.; Bedd. Ferns of Brit. India, t. 167.

Stipes 15-30 cm. long, polished, dark chestnut-brown, glabrous; fronds dichotomus, with the main divisions flabellately branched; central pinnæ 15-23 cm. long, 2.5-3.8 cm. broad; pinnules 13-20 mm. long, 6 mm. deep, dimidiate, broadest on the side nearest the stem, the upper and outer margin lobed, sometimes one-third down, the lowest on short slender stalks; texture pellucid-herbaceous; rhachises and surfaces naked; sori roundish or transversely oblong, 2·4 mm. broad.

Distribution: N.-W. Himalayas from Garhwal to Sikkim, 6,000—9,000 ft.—Japan, N America.

It is still employed in North America, as a pectoral in chronic catarrhs.

English: Canadian Maidenhair—; *French:* Capillaire du Canada—; *Spanish:* Capilera del Canada, Culantrillo del Canada—.

7. **Adiantum flabellulatum** Linn.; Bedd. Ferns of S. India, t. 218.—PLATE 1030.

Scales on the rhizome long, linear, lax, chestnut-coloured; fronds flabellate, bipartite-pedately divided, tripinnate; secondary pinnæ lanceolate-acuminated; pinnules glabrous, subcoriaceous-chartaceous, obliquely cuneate or semi-orbicular-cuneate, superior base truncate, superior margin 2-4-lobed and serrate-dentate in the sterile one; lobes soriferous; involucres large, the breadth of the lobe, oblong, straight, rarely a little curved, hard coriaceous; stips elongated ebeneous-scabrous below; the rest, as well as the slender rhachis, glossy and glabrous.

Distribution: Nepal, Assam, Khasia, Sylhet, Ceylon: Ouvah District, Malay Peninsula.—Malay Islands, S. China, Japan.

The herb is used in China as a cough medicine.

Chinese: T'ieh Hsien Ts'ao—.

CHEILANTHES Sw.

Sori terminal, or nearly so, on the veins, at first small subglobose, afterwards more or less confluent; indusium formed of the changed reflexed margin, roundish and distinct, or more or less confluent, but not quite continuous; fronds subcoriaceous in texture, mostly under 30 cm., often under 15 cm. long, 3-4-pinnatifid; veins free.—Species 120.—Tropical and temperate regions, xerophytic.

C. hirta Swartz. is used medicinally in South Africa.

1. **Cheilanthes tenuifolia** (Sw.); Bedd. Ferns of S. India, t. 188.—Plate 1026.

Annual, caudex short-creeping, scaly; stipes elongated, rarely scaly; frond submembranaceous, glabrous 7.5-10 cm. to a span and more long, ovate acuminate, or more or less deltoid, subtripinnate, ultimate lobes of the primary and secondary divisions the largest, more or less pinnatifid; pinnules elliptic, oblong or oblong-lanceolate subpinnatifid or crenate, with broad blunt teeth; involucres mostly elongated, more or less confluent, more or less crenated or denticulate, sometimes transversely wrinkled; stipes and rhachis purple-black, main rhachis winged above, secondary and tertiary rhachises all with a narrow wing.

Distribution: Madras Presidency up to 4,000 ft., Bengal, Plains in Assam, Chittagong, Dacca, Chota Nagpur, Khasia up to 3,500 ft., Sikkim, Malay Peninsula.—China, Australia, New Zealand, Polynesia, Uruguay, Malay Islands.

The Santals prescribe a preparation from the roots for sickness attributed to witchcraft or the evil eye.

Santali: Dodhari, Nanha—.

Pteris Linn.

Sori marginal, linear, continuous, occupying a slender filiform receptacle in the axis of the indusium; indusium the same shape as the sorus, usually membranous, at first quite covering it, at length more or less spreading.—Species 160.—Cosmopolitan.

Rhizome nutritive, astringent, vermifuge, and abortifacient.

P. aquilina Linn. is used medicinally in Europe, China, La Reunion—; *P. multifida* Poir. in China—; *P. leptophylla* Sw., *P. palmata* W., *P. pedata* Sw. in Brazil.—; *P. buchanani* Bkr. in Basutoland—.

1. **Pteris aquilina** Bedd. Ferns of S. India, 40, t. 42.

Rhizome stout, creeping underground; stipes about 30 cm. long, strong, erect, naked; fronds 0.6-1.8 m. long, 30-60 cm. broad, subdeltoid in outline, only the uppermost pinnæ simple, the next lanceolate cut down nearly or quite to the rhachis into short triangular or linear pinnules, the lowest long-stalked, 30 cm. or more long, with ample lanceolate pinnules which are cut down to the rhachis into numerous lanceolate segments, which are again fully pinnate; largest entire ultimate segments 2.5 cm. long, 4 mm. broad; texture thin or subcoriaceous; rhachis and surfaces naked or pubescent; veins close, conspicuous, often twice forked; involucre double, or the inner obsolete.

Distribution: Throughout the whole world except the arctic zones and temperate S. America.

The rhizome is reputed astringent and anthelmintic.

A decoction of the rhizomes and fronds has been given in chronic disorders arising from obstructions of the viscera and spleen.

Cantonese: K'uet—; *Catalan:* Falguera femella—; *Chinese:* Chueh—; *Dutch:* Groote varen, Varen—; *English:* Bracken, Brakes—; *French:* Filipode, Fougère à l'aigle, Fougère commune, Fougere femelle, Fougère impériale, Fruchière, Ptéride—; *German:* Adlerfarn, Farnkrautweiblein, Fluegelfarn, Jesuschristuswurzel—; *Ireland:* Fern of God—; *Languedoc:* Feuvé—; *Malaya:* Keat—; *Malayalam:* Tavi—; *Malta:* Bracken, Eagle Fern, Felce aquilina, Felce capannaja, Felicilla, Felicita—; *New Caledonia:* M'Baoue—; *New Zealand:* Aruhe, Rahurahu—; *Portuguese:* Feto—; *Punjab:* Dio, Kakei, Kakhash, Lungar—; *Roumanian:* Navalnic pajuriu, Spinarea lupului—; *Russian:* Paporotnik—; *Saora:* Manmarda—; *Spanish:* Helecho hembra—; *Tamil:* Parnai—.

ASPLENIUM Linn.

Sori dorsal or submarginal, linear or oblong; indusium similar in shape, straight, single, plane or tumid, bursting along the outer edge; veins free.—Species 540.—Cosmopolitan.

Diaphoretic and bechic.

The following species are used medicinally in Europe—*A. adiantum-nigrum* Linn., *A. ruta-muraria* Linn., *A. trichomanes* Linn.—; in La Reunion—*A. adiantum-nigrum* Linn.—; in South Africa—*A. adiantum-nigrum* Linn., *A. cuneatum* Linn., *A. furcatum* Thunb., *A. monanthemum* Linn., *A. trichomanes* Linn.—; in Brazil: *A. regulare* Sw., *A. sulcatum* Lam.—.

1. **Asplenium adiantum-nigrum** (Linn.); Bedd. Ferns of Brit. India t. 62.

Stipes tufted, 15-23 cm. long, nearly glabrous, polished; fronds bi-tripinnate, deltoid to lanceolate, 15-30 cm. long, 10-15 cm. broad at the base; pinnæ numerous, the lower ones deltoid, their lower pinnules again stalked and completely pinnate and lanceolate deltoid in shape, the ultimate segments ovate or oblong, acutely serrate, texture coriaceous; veins obscure, oblique; sori copious, invclucre with an entire margin.

Distribution: Kashmir, 5,000—8,000 ft., extending to Dalhousie and Chamba.—Europe, N. Asia, N. Africa, S. Africa and its islands, Sandwich Islands.

The plant is bitter; diuretic, laxative; lessens inflammation, hiccough; useful in ophthalmia, diseases of the spleen, jaundice; produces sterility in women (Yunani).

A decoction or syrup of the fronds is used as an expectorant, pectoral, and emmenagogue in Europe.

The rhizome is used as an anthelmintic by the Sutos.

Catalan: Falsia negra—; *English:* Black Spleenwort—; *French:* Capillaire noir—; *La Reunion:* Capillaire noir—; *Spanish:* Capilera negra—; *Suto:* Lehorometso—.

2. **Asplenium ruta-muraria** (Linn.); Bedd. Ferns of Brit. India, t. 61.

Stipes tufted, 5-10 cm. long, slender, wiry, naked, ebeneous towards the base; fronds 2.5-5 cm. long, about 2.5 cm. broad, glabrous, deltoid, cut down to the rhachis into a few pinnæ on each side, the lower ones again cut down into spathulate cuneate pinnules, which are serrated round the outer edge; texture coriaceous; rhachis firm, green, naked; veins flabellate; sori copious; margin of indusium fimbriate.

Distribution: Kashmir.—Europe, N. Africa, Tibet, Siberia, United States.

This small herb is used as a deobstruent and expectorant. It is likewise good for them that have a cough, or are shortwinded, or be troubled with stitches in the sides.

The leaves are used as a remedy for the cure of rickets.

Catalan: Falsia blanca, Ruda de rata—; *English:* Tentwort, Wall Rue—; *French:* Capillaire blanc, Doradille des murailles, Rue des murailles, Sauve-vie—; *German:* Weinkraeutel—; *Spanish:* Calantrillo blanco mayor—.

3. **Asplenium trichomanes** (Linn.); Bedd. Ferns of S. India, t. 147.

Stipes densely tufted, 2.5-10 cm. long, naked glossy brown or black; fronds 15-30 cm. long, about 13 mm. broad, with 15-30 opposite pairs of sessile horizontal pinnæ, which are 6-10 mm. broad. 3-4 mm. deep, the edge slightly crenate, the two sides unequal, the upper one the broadest and narrowed suddenly at the base; texture subcoriaceous; veins pinnate, inconspicuous; rhachis polished sori linear-oblong, 3-6 on each side of the midrib.

Distribution: Nilgiris, Kashmir to Kumaon 5,000—10,000 ft.—All over the world.

This is a laxative medicine. It is used as an expectorant in Scotland.

The leaf is smoked by the Sutos for colds in the head and chest.

Catalan: Falsia roja—; *English:* Common Spleenwort, Maidenhair—; *French:* Polytric des officines—; *German:* Rotes Frauenhaar—; *Spanish:* Politrico—; *Suto:* Lehorometso—; *Tamil:* Mailakkondei—.

4. **Asplenium falcatum** Lam.

Stipes tufted, 15-23 cm. long, erect, greyish, glabrous, or more or less scaly; fronds 15 cm. to 60 cm. long or more, 10-20 cm. broad; pinnæ stalked, 6-20 pairs, alternate, subopposite or opposite, lanceolate, often caudate, 1.3-2.5 cm. broad, the edges serrated or lobed, with the lobes serrate, the 2 sides unequal, and the lower one at the base obliquely truncate; texture coriaceous; rhachis glabrous or fibrillose; veins very oblique; sori in long irregular lines reaching nearly to the margin.

Distribution: Madras Presidency, W. Mountains, Ceylon, Malay Peninsula.—Australia, S. Africa, Polynesia.

The plant is used in enlargement of the spleen, incontinence of urine, calculus, jaundice, and malaria.

Bombay: Pana—.

ATHYRIUM Roth.

As in Asplenium, but the involucres, or at least many of them, more or less curved, often horseshoe-shaped, rarely quite uniform.—Species 120.—Cosmopolitan.

This genus is therapeutically inert.

1. **Athyrium filix-fœmina** Roth.

Fronds 30-120 cm., lanceolate, narrowed at both ends, membranaceous, green, bipinnate; rhachis soft, appearing triangular or furrowed when dry; primary pinnæ narrow linear-oblong, hardly narrowed at the base; secondary pinnæ 0.6-2.5 cm., oblong, patent at right angles to the rhachis of the primary pinnæ, sessile or decurrent, serrate or pinnatifid; margin bluntly or acutely toothed; involucres in two rows on the secondary pinnæ, short, oblong, subpersistent.

Distribution: Himalayas 6,000—13,000 ft., Sind, Bombay Presidency.

The rhizome is sometimes used as a substitute for that of the Male-fern.

Catalan: Falguera femella—; *Spanish:* Helecho hembra—.

ACTINIOPTERIS Link.

Sori linear, elongated, submarginal; indusium the same shape as the sorus, folded over it, placed one on each side of the narrow segments of the frond opening towards the midrib : a single species like a miniature palm.

1. **Actiniopteris dichotoma** Bedd.—PLATE 1027.

Stipes densely tufted, 5-15 cm. long; fronds like fans, 2.5-3.8 cm. deep, composed of numerous dichotomous segments which are rush-like in texture, not more than 1 mm. broad, the veins few and subparallel with the indistinct midrib, the segments of the fertile frond longer than those of the barren one.

Distribution: Throughout India, especially the Peninsula, in dry rocky places, below 4,000 ft., Ceylon.—N. Africa, Mascarene Islands, Persia, Afghanistan.

It is used as an anthelmintic and a styptic.

Bombay: Mapursika, Mayursikha—; *English:* Peacock's Tail—;

North-Western Provinces: Morpach, Morpankhi—; *Sanskrit:* Mayurshikha—.

ASPIDIUM Swartz.

Indusium orbicular or reniform, or sometimes irregular and abnormal, being linear and curved, or sometimes absent; veins compoundly anastomosing with generally free veinlets in the areoles, receptacles compital or often at the apex of the free veinlets; fronds very various, from simple to tripinnatifid, often membranaceous and flaccid.

The genus is credited with anthelmintic properties.

The following species are used medicinally in Europe—*A. fragile* Sw., *A. roeticum* Linn.—; in China—*A. falcatum* Sw.—; in North America—*A. marginale* Sw., *A. spinulosum* (Mill.) Sw., *A. trifoliolatum* Sw.—; in South Africa—*A. aculeatum* Sw. var. *pungens* Klf., *A. athamanticum* (Hook.) Kuntze—.

OFFICIAL:—The rhizome and stipes of *A. Filix mas* Swartz in Austria, Denmark, France, Holland, Hungary, Norway.

1. **Aspidium polymorphum** (Wall.); Bedd. Fl. S. India, t. 116, 117.

Rhizome suberect, stipes tufted, yellowish or brown, paleaceous only at the base; fronds large, 30-120 cm. long, by 30 cm. or more broad, pinnate; pinnæ 3-6 on each side, oblong or elliptic, acuminate, unequal at the base, sometimes contracted when fertile, quite entire to crenate or coarsely toothed, stalked or subsessile, the terminal one often more or less lobed or subpinnatifid, the lowest pair generally (not always) bifurcate; texture herbaceous to subcoriaceous; main veins prominent and distinct to the margin, with many free included simple or forked veinlets; sori on the netted veins, small and scattered in the uncontracted fronds, large and more or less in 2 rows between the main veins in the contracted ones; indusium reniform or often quite absent.

Distribution: Western forests of Madras Presidency, N. India, Burma, Ceylon.—Malay Islands to the Philippines.

The plant is used as as anthelmintic.

DRYNARIA J. Sm.

Fronds articulate with the caudex, with either a separate sterile frond like an oak leaf, or the base of the frond pinnatifid and oak-leaf-like; veins copiously anastomosing, forming quadrate or hexagonal areoles; sori small, round or oval, numerous.—Species 20.—Palæotropics.

The genus is therapeutically inert.

1. **Drynaria quercifolia** J. Sm.—*Polypodium quercifolium* Linn.; Bedd. Ferns of S. India, t. 187.—PLATE 1032.

Rhizome creeping, short, stout, densely clothed with red-brown satiny lanceolate-subulate soft scales, which have a cordate base, and are 6-13 mm. long; fronds coriaceous or subcoriaceous of two kinds, sterile ones varying in size from 7.5-30 cm. and more long, and 18-20 cm. wide, green when very young, but soon turning dark brown, glossy, cordate-ovate variously lobate-pinnatifid, sometimes halfway down to the costa; fertile ones 60-90 cm. long, long-petiolate broad-ovate deeply nearly to the rhachis pinnatifid, segments 12.5-23 cm. long, 2.5-3.8 cm. wide, oblong acuminate, entire; venation manifest, costules distinct rather distant, united by transverse veins forming 4-6 primary soriferous areoles filled up with a network of small quadrangular areoles with or without free veins; sori compital small, numerous, two in each primary areole, consequently in two series between and parallel with the costules.

Distribution: Throughout India, in the plains or very low down in the mountains, on trees or rocks.

The root is bitter; tonic, astringent to the bowels; used in typhoid fever (Ayurveda).

The plant is used in the treatment of phthisis, hectic fever, dyspepsia, and cough.

Ilocano: Capcapa—; *Malayalam:* Pannakilhannumaravala—; *Marathi:* Ashvakatri, Basingh, Wandurbashing—; *Pampangan:* Gona, Tibatib—; *Sanskrit:* Ashvakatri—; *Tagalog:* Pacpaclauin, Paipaiamo—; *Visayan:* Cabcab, Cabcaban, Cabcabun—.

PLEOPELTIS Humb. & Bonp.

Veins copiously anastomosing, forming copious irregular areoles, with generally free included veinlets spreading in various directions, the sori various in position, generally on the back of united veinlets; fronds simple, pinnatifid or pinnate, articulate with the caudex.

P. lanceolata Linn. is used medicinally in Mexico.

1. **Pleopeltis lanceolata** (Linn.).—*Polypodium lepidota* Hook.; Bedd. Ferns of S. India, t. 181.

Rhizome long-creeping, paleaceous, with lanceolate ferruginous scales, stipes remote, 2.5-5-10 cm. long; fronds coriaceous, 7.5-23 cm. long, 6-20 mm. wide, lanceolate, more or less acuminate, long and gradually attenuated at the base, copiously furnished with orbicular ovate, small appressed peltate scales dark in the centre, pale in the circumference and denticulate; veins immersed indistinct, the primary veins form large obliquely elongated areoles, which include very irregular and different sized areoles, and a few free veinlets which are rarely forked; sori generally very large and often exceedingly prominent, pulvinate globose or oval, stalked scales mixed with the spore cases.

Distribution: W. Ghats of the Madras Presidency, Assam, Ceylon.—Tropical America, W. Indies, S. Africa and its islands, St. Helena, Sandwich Islands.

In Mexico, a tea made from the fronds is taken to cure the itch.

LYGODIUM Sw.

Capsules solitary (or casually in pairs), in the axils of large imbricated clasping involucres, which form spikes either in separate pinnæ or in lax rows along the edge of the leafy ones; fronds scandent, pinnæ conjugate palmate-lobed, pinnatifid or pinnate; veins forked, free.

L. japonicum Sw. is used medicinally in China.

1. **Lygodium flexuosum** (Sw.).—*L. pinnatifidum* Sw.

Fronds glabrous or slightly hairy, pairs of fronds stipitate-pinnate with the pinnules again pinnate or variously lobed, or sub-palmate, all serrulate; sori protruding from the margin; texture subcoriaceous.

Distribution: S. India, N. India up to 5,000 ft. in the Himalayas, Ceylon, Malay Peninsula, Malay Islands, N. Australia, tropical Africa.

The plant is used as an expectorant.

In Tirhut, the fresh root is boiled with mustard oil and used externally in rheumatism, sprains, scabies, ulcers, eczema, and cut wounds. It is particularly useful as a local application to carbuncles.

Malayalam: Vallipanna—; *Tirhut:* Kalazha—.

2. **Lygodium japonicum** (Sw.).

As in flexuosum, only that the pinnæ are much smaller, with the pinnules smaller and finely cut, the fertile ones often so contracted that there is little or no lamina present.

Distribution: N. India, S. India: Western Mountains.—China, Japan, Australia, Malay Islands, Philippines.

The plant has expectorant properties.

Chinese: Hai Chin Sha.

OSMUNDACEAE

Capsule 2-valved, opening across the apex, furnished with a short horizontal wing, vernation circinate.—Genera 2. Species 12.—Tropical and temperate countries.

The Order is therapeutically inert.

Osmunda Linn.

Fertile frond wholly, on the upper or middle portion, contracted, forming simple or compound sporangiferous panicles; veins forked, free; fronds pinnate or bipinnate, articulated with the rhachis.—Species 10.—Temperate and tropical countries.

O. regalis Linn. is used medicinally in Guinea and Europe.

1. **Osmunda regalis** (Linn.); Bedd. Ferns of S. India, t. 76.

Stipes tufted, 30-45 cm. long, firm, erect, naked; fronds 60-120 cm. long, 30 cm. or more broad, bipinnate, the barren and fertile separate, or the frond barren below and fertile above, barren pinnæ 15-30 cm. long, 5-10 cm. broad, pinnules sessile or slightly stalked, 2.5-5 cm. long, 13-20 mm. broad, oblong, blunt, often unequal at the base, the edge finely serrulate, texture subcoriaceous, rhachis and both sides naked, fertile pinnules cylindrical, forming a copious panicle.

Distribution: W. Ghats, N. India, Kumaon, Bhutan, Khasia 4,000—6,000 ft.

The plant is tonic and styptic. It is used for rickets in England.

In Guinea, an extract is prepared and is used externally for rheumatism and internally for intestinal griping.

English: Flowering Fern, Osmund-the-Waterman, Royal Fern, Royal Flowering Fern—; *French:* Fougeiroux, Fougěre aquatique, Fougěre fleurie, Fougere royale, Osmonde, Osmonde fleurie, Osmonde royale—; *German:* Koenigsfarn, Traubenfarn—; *Hova:* Ampangafenakoho—; *Spanish:* Helecho acuatico, Helecho florido, Helecho real—.

OPHIOGLOSSACEAE.

Capsule deeply 2-valved, opening down the side nearly to the base, without a ring; vernation erect; terrestrial or epiphytic.—Genera 3. Species 50.—Tropical and temperate countries.

Vulnerary and mildly laxative.

OPHIOGLOSSUM Linn.

Capsules sessile, arranged in two rows, forming a narrow close spike, which arises from the base or centre of the barren segment; rarely distinct, rising direct from the corm; veins reticulated; fronds simple entire, rarely palmate.—Species 30.—Tropical and temperate regions.

O. vulgatum Linn. is used medicinally in Europe, South Africa, and La Reunion.

1. **Ophioglossum vulgatum** (Linn.).

Rhizome not tuberous, short, or elongated, producing annually 1-2 fronds; fronds 15-23 cm. long, the sterile division generally placed about the middle 5-10 cm. long, 2-5 cm. broad, ovate or ovate-oblong, without a distinct haft, texture stouter than in the others, the midrib usually indistinct; fertile spike 2.5 cm. long or rather more, on a peduncle 5-10 cm. long, and considerably overtopping the sterile division when fully mature.

Distribution: Sikkim 4,000 ft., below Darjeeling 2,000 ft.—Europe, Africa, America, Japan, Australia, New Zealand, Sandwich Islands.

A preparation from this plant known as the "green oil of charity," is in request in England as a vulnerary and remedy for wounds.

The plant is held in Spain as a vulnerary of great repute

The plant yields a mucilaginous and astringent decoction which is used in angina in La Reunion. The fronds are considered tonic and styptic and used in contusions, wounds, and hæmorrhages.

A warm decoction of the rhizome is used by the Sutos as a lotion for boils.

Catalan: Llansa de Cristo, Llengua de serp—; *English:* Adder's Tongue, Christ's Spear—; *French:* Herbe à daucune, Herbe sans couture, Lance de Christ, Langue de serpent, Luciole, Ophioglosse, Ophioglosse commune, Petite serpentaire, Serpentine—; *Hausa:* Mashinzomo—; *La Reunion:* Herbe un coeur, Herbe paille-en-queue, Langue de serpent—; *Spanish:* Lengua de serpiente—; *Suto:* Mmadiyo, Tsebe-ngwe, Tseyananyane—.

HELMINTHOSTACHYS Kaulf.

Capsules in long crested clusters which form a long loose spike; veins forked, free; fertile spike rising from the base of the leafy segment; fronds stipate, sterile segments foliaceous, digitate. A genus of a single species.—Species 1.—Ceylon, Himalaya to Queensland.

1. **Helminthostachys zeylanica** (Linn.).

Rhizome thick, fleshy, creeping; stipes often 30 cm. long, barren segment palmately pinnate, often in three principal divisions which are stalked, and again forked or pinnate, the ultimate divisions linear-oblong, 7.5-10 cm. long, 2-2.5 cm. broad, the apex acuminate, the edge slightly toothed or entire, texture herbaceous; fertile spike solitary, arising from the base of the barren segment, 7.5-10 cm. long, 13 mm. broad, the firm peduncle about as long as the fructification.

Distribution: S. India, Ceylon, N. India, Bengal plains to Assam and Cachar, Malay Peninsula.--Malay Islands, Philippines, tropical Australia, New Caledonia.

It is regarded in the Moluccas as a slight aperient.

BOTRYCHIUM Sw.

Capsules sessile, arranged in two rows, on the face of spikes which form a compound panicle; veins forked, free; fronds erect, the sterile segments foliaceous, deltoid, bi-tripinnatifidly compound, rarely pinnate; fertile segments rhachiform, compound paniculate.—Species 40.—Cosmopolitan.

B. ternatum Sw. is used medicinally in China.

1. **Botrychium lunaria** Sw.; Bedd. Ferns of Brit. India, t. 208.

Rhizome small, scarcely thickened, enclosed by brown sheaths furnished with stoutish fleshy brittle branched roots; stipes erect, smooth, cylindrical, hollow, succulent, vernation plicate or folded straight, the fertile branch clasped by the sterile before unfolding, fronds solitary, 7.5-25 cm. high, firm, stout, fleshy, sterile branch oblong, pinnate smooth, pinnæ 4-7 pairs flabellate or lunate, the margins crenate (rarely partially fertile) fertile branch pinnate or bipinnate; venation (barren pinnæ) flabellately-furcate, *i.e.* the vein enters at the base and is repeatedly forked, veins not quite extending to the margin.

Distribution: N. India, Sikkim 11,000—13,000 ft., Kumaon 12,000 ft.—Arctic and cold temperate zone extending to S. Europe, Patagonia, Australia.

A good vulnerary. Also used in dysentery.

English: Moonwort—; *French:* Herbe aux serpents, Petite lunaire—; *German:* Walpurgiskraut—; *Italian:* Vindicta—.

2. **Botrychium ternatum** (Sw.).

Stipe 2.5-5 cm. long; petiole of the sterile segment 5-20 cm. long, the latter 7.5-15 cm. each way, deltoid 3-4-pinnatifid; lower pinnæ much the largest and pinnules of the lower side larger than the others, oblong or subdeltoid, stalked, the ultimate divisions oblong or obovate, often 6 mm. broad, blunt or acute, slightly toothed; fertile peduncle up to 45 cm. long, generally considerably overtopping the sterile segment; panicle 2.5-18 cm. long, deltoid very compound.

Distribution: Near Simla, E. Himalaya,—Australia, Tasmania, New Zealand, Japan, Lapland to Siberia, Pyrenees, United States southwards to New Granada.

The plant is used as a vulnerary. The root is prescribed in dysentery.

Chinese: Yin Ti Chueh—.

EQUISETACEAE.

Stem symmetrical erect or scrambling from a perennial creeping rootstock, jointed, sulcate, hollow except at the septa and with air canals beneath the grooves. Leaves reduced to the teeth of a foliar sheath arising from one internode and embracing the next, the teeth corresponding with the ridges. Branches 0 or whorled, springing from inside the base of the foliar-sheath and alternating with the teeth. Sporangia 5-10 on the under-surface of the sporophylls, which correspond in position and origin to the leaves and become modified into the peltate scales of a terminal cone, either on the summit of ordinary or of special cone-bearing stems. Sporangia opening by a slit towards the stalk of the sporophyll. Spores of one kind, developed from hypodermal archesporium as in the ferns, with several coats which split into spiral hygroscopic bands (elaters), the function of which appears to be to keep groups of spores (which develop functionally one-sexual prothalla) together. Prothallium well developed, flat and pluricellular.—Only one genus.

EQUISETUM Linn.

Characters of the family.

Species 25.—Cosmopolitan.

The genus is diuretic and astringent.

The following species are used medicinally in Europe—*E. arvense* Linn., *E. fluviatile* Linn., *E. hyemale* Linn., *E. limosum* Linn., *E. palustre* Linn.—; in China & Indo China—*E. arvense* Linn., *E. hyemale* Linn.—; in Madagascar, Basutoland, Zululand—*E. ramosissimum* Desf.—.

1. **Equisetum debile** Roxb. Incon. Roxb. Suppt. 5, t. 3.

Stems lax scrambling and often attaining 3 m. among bushes. Branches long slender few, often only 2-3 in a whorl. Internodes 3.8-10 cm. long. Leaf teeth 1.75-3 mm. long, subulate-acuminate, black with scarious margin, very variable in number from 8-9 to many more on luxuriant plants. Cone or spike 8-18 mm. long, sessile in the funnel-shaped tip of the branch until mature then very shortly stalked; tip rounded or apiculate. Peltate sporophylls orbicular or oblong about 1.25 mm. diam., pale with a black centre. Sporangia oblong, yellow.

Distribution: All over India, along shady streams.

The plant is administered as a cooling medicine, and near Jhelum is given for gonorrhœa (Stewart).

Burma: Myetsek—; *Punjab:* Bandukei, Buki, Matti, Nari, Skinung, Trotak—; *Santal:* Burukatkomcharec—.

FUNGI.

They are hardly of any medicinal importance. Some are edible; others are acrid and poisonous.

Alkaloids and substances of an alkaloidal nature have been isolated—agmatine, 4-β-aminoethylglyoxaline, aminosecalesulphonic acid, clavine, ergotamine, ergothioneine, ergotinine, ergotoxine, muscarine, p-hydroxy-β-phenyl-ethylamine—.

OFFICIAL:—*Boletus fomentarius* Linn.=*Polyporus fomentarius* Fries and *B. purgans* Pers.=*P. officinalis* Fries in Portugal.

Claviceps purpurea Tulasne (Austria, Belgium, Denmark, France, Great Britain, Holland, Hungary, Japan, Norway, Portugal, Spain, Sweden, Switzerland)=*Sclerotium Clavus* DC. (Italy),—(Fries) Tulasne (Germany, Russia, Turkey, United States).

Polyporus fomentarius Fries (Austria, France), *P. officinalis* Fries (Austria, France, Switzerland), *P. Laricis* (Jacquin) Delle Chiaje=*P. officinalis* (Will.) Fries (Italy)

AGARICUS Linn.

A. muscarius Linn. is used medicinally in Europe, *A. Bretschneideri* Kalich. & Tuem. and *A. ostreatus* Jacq. in China.

1. **Agaricus (Psalliota) campestris** Linn.

This fungus is common in many parts of India. It is to be found chiefly in cattle-fields of the Central Punjab after the rains, in the barren desert tracts of Central and Southern Punjab, and also Baluchistan and Afghanistan.

Three kinds: white, black, red.—Cooling, tonic, laxative, aphrodisiac; indigestible; cause "tridosha," vomiting, dysentery, fever, bronchitis, irregularities in the system; red variety least harmful (Ayurveda).

White and red varieties edible; useful in diseases of the nose and eye, pain in the liver, hydrocele, paralysis, weakness.—The black variety is indigestible and poisonous (Yunani).

The dried mushrooms are regarded as alterative in the Punjab.

Arabic: Fitar—; *Assam:* Katphula—; *Bengal:* Bhuichhati, Chhata

Chhatakuda—; *Bombay:* Alombe, Kalambe, Khumba—; *Catalan:* Bolet de cam, Bolet comu—; *Chamba:* Moksha, Mopsha—; *English:* Common mushroom, Mushroom—; *French:* Psalliote champêtre—; *German:* Brachpilz, Champigon, Pferdechampigon, Tafelpilz—; *Gujerati:* Kagdanachhatra, Mindadnivali—; *Hausa:* Namanangulu, Namankassa. Namankaza—; *Hindi:* Chhata, Chhatona, Phenchhatar, Sanpakichhatri—; *Kashmir:* Manskhel—; *Konkani:* Kamila, Onlombem—; *Marathi:* Alambi, Bhuiphoda, Satri—; *Persian:* Chatrimar, Kullalicdiv, Samarogha, Samarugh—; *Portuguese:* Cogumelo—; *Punjab:* Bleophore—; *Sanskrit:* Bhuchhatra, Bhumichhanna, Bhumichhattra, Bhumisphota, Bhusuta, Chhatra, Dharankusa, Kavacha, Prithavikanda, Sansvedajashaka, Shilinghraka, Uchhilindhra—; *Santali:* Ot—; *Sind:* Khumba, Kutilenbha—; *Spanish:* Agarico campesino, Seta campesina, Seta comun—; *Urdu:* Kakamitha—.

2. **Agaricus (Pleurotus) ostreatus** (Jacq.) Fries.

Ground to a paste with water it is applied to the gums in cases of excessive salivation, and to the mouths of children suffering from aphthæ.

It is used to stop hæmorrhage. Internally it is given in dysentery and diarrhœa.

Chinese: T'ien Hua Hsin—; *Cutch:* Phanasa alambe, Phansamba—.

3. **Agaricus igniarius.**

Sweet at first, then very bitter and acrid; cathartic, carminative, emmenagogue, alexiteric, diuretic; tonic to heart, brain, and muscle; lessens expectoration, biliousness, inflammation; useful in headache, nose and eye troubles, hemicrania, chronic asthma, pain in the chest, diseases of liver and spleen (Yunani).

It is generally used as a styptic externally, and internally as a bitter tonic and laxative.

Arabic: Agarikun, Gharikun—; *Chenab:* Butikamochka—; *Hindi:* Garigond, Gharikun—; *Kashmir:* Bulgarjangli—; *Punjab:* Kiain—.

POLYPORUS Fries.

P. fomentarius Fries is officinal in Austria, France, and Portugal; *P. officinalis* Fries in Austria, France, Italy, Portugal, and Switzerland.

1. **Polyporus anthelminticus** Berk.

It is used as an anthelmintic in Burma, where it grows at the root of old bamboos.

Pegu: Jhanmo, Wamo—.

2. **Polyporus officinalis** Fries.

It is diuretic, laxative, and expectorant. It is used as a nervine tonic.

This fungus was considered by the ancient Greeks and Romans as a universal remedy for all complaints, and during the Middle Ages many an alchemist made use of it in his search for the Elixir of Life.

Dioscorides (about 200 A.D.) gives us an account of the versatility of this mushroom as a remedy for the most diverse diseases :—" Its properties are styptic and heat-producing, efficacious against colic and sores, fractured limbs, and bruises from falls : the dose is two obols weight with wine and honey to those who have no fever, in fever cases with honeyed water; it is given in liver complaints, asthma, jaundice, dysentery, kidney diseases where there is difficulty in passing water, in cases of hysteria, and to those of a sallow complexion; in cases of phthisis it is administered in raisin wine; in affections of the spleen with honey and vinegar . . . . it stops bleeding when taken with water in three-obol doses; it is good for pains in the loins and joints, in epilepsy when taken with an equal quantity of honey and vinegar . . . it is an antidote for poisons in one drachma doses with dilute wine. In three-obol doses with wine it is a relief in cases of bites and wounds caused by serpents."

Dutch: Lorkenzwam—; *English:* Larch Agaric, Purging Agaric, White Agaric—; *French:* Agaric blanc, Agaric du mélèse—; *German:* Lerchenschwamm—; *Greek:* Agarikon—; *Hindi:* Chhattri—; *Italian:* Agarico del larice—; *Punjab:* Kiain—; *Spanish:* Agarigo del alerce—.

BOLETUS Dill.

B. fomentarius Linn. (*Polyporus fomentarius* Fries) and *B. purgans* Pers. (*P. officinalis* Fries) are officinal in Portugal.

1. **Boletus crocatus** Batsch.

Ground to a paste and mixed with water it is applied in Western India to the gums in cases of excessive salivation, It is also administered internally in diarrhœa and dysentery.

MYLITTA Fries.

M. lapidescens Horan is used medicinally in China and Indo-China.

1. **Mylitta lapidescens** Horan.

This fungus is regarded as diuretic.

In China, it is recommended in epilepsy, chorea, and other nervous affections of children, and for destroying parasites in the skin.

Annam: Loi hoan—; *Cantonese:* Lui uen—; *Chinese:* Lei Wan—; *Malaya:* Loo.yoon—; *Tamil:* Karunpallagam—.

AURICULARIA Bull.

1. **Auricularia sambucina** Mart.

According to Gerard in his Herbal (1597) it "is much used against the inflammations and all other sorenesses of the throat, being boiled in milk, steeped in beer, vinegar, or any other convenient liquor."

We find a reference to it in Bacon's Sylva Sylvarum (1627) where the Juda's Ear is described as "an herb that groweth upon the roots and lower parts of the bodies of trees; especially of Elders and Ashes. It has a strange property : for in warm weather it swelleth and openeth extremely. It is not green, but of a dusky brown colour. And it is used for squinancies and inflammations in the throat : whereby it seemeth to have a mollifying and lenifying verture."

This fungus has emetic and purgative properties.

English: Jew's Ear, Judas's Ear—; *German:* Iudasohr—.

ALGAE.

Some are nutritive; a few are used as mucilaginous, antiscrofulous and anthelmintic.

OFFICIAL :—*Alsidium helminthocorton* Kuetz. (France).

Chondrus crispus Lyngbye (Austria, Denmark, France, Holland, Switzerland),—Stack. (Belgium),—(Linne) Stockhouse (Germany).

Eukeuma spp. (Spain).

Fucus crispus Linn.=*Chondrus crispus* Lyngbye, *F. digitatus* Linn.=*Laminaria digitata* Lamour., *F. vesiculosus* Linn. (Portugal).

Gelidium spp. (France, Japan, Russia, Spain, Sweden, United States); *G. Amansii* Lamouroux (Germany, Japan, Turkey); *G. corneum* (Huds.) Lamouroux (Great Britain, United States); *G. cartilagineum* (Linn.) Gaill. (Great Britain).

Gigartina mammillosa Agardh (Austria, Belgium, Denmark),—J. Agardh (Holland),—J. G. Agardh (Switzerland),—(Goodenough and Woodward) J. Agardh (Germany).

Gracilaria spp. (France, Spain).

Laminaria Cloustoni Edmonds.=*L. digitata* Lamour. (Spain).

Plocaria Helminthocorton End.=*Gigartina Helminthocortos* Lamour. (Portugal).

LICHENES.

Nutrient, bitter, tonic.

OFFICIAL:—*Cetraria islandica* Acharius (Austria, Belgium, France, Holland, Hungary, Italy, Japan, Switzerland);—(Linne) Acharius (Germany, Turkey).

Lichen islandicus Linn.=*Cetraria islandica* Acharius, and *L. pulmonarius* Linn.=*Pulmonaria reticulata* Hoffm.=*Sticta pulmonacea* Acharius (Portugal).

PARMELIA.

P. furfuracea Ach., *P. parletina* Ach., *P. pulverulenta* Ach. are used medicinally in Europe; *P. conspersa* Ach. in Southern Africa.

1. **Parmelia kamstchadalis,** Ach.
2. **P. perlata,**
3. **P. perforata.**

These three species are in general use as medicines in India.

Arabic: Ashina, Hazazelsakhar, Ushirah, Ushnah—; *Canarese:* Kaladu, Kalahu—; *Gujerati:* Chadila, Ghabilo, Patharaphula—; *Hindi:* Bhurichharila, Charcharela, Charela, Chharila, Patharkaphul, Silabak—; *Marathi;* Barikadagadaphula, Dagadaphula, Mothadagadaphula—; *Persian:* Dowalah, Duhala—; *Punjab:* Ausneh, Chalchalira, Charcharila, Hiunsew—; *Sanskrit:* Ashmapushpa, Giripushpaka, Griha, Jirna, Kalanusarya, Kalanusaryaka, Palita, Shailaja, Shailaka, Shailakhya, Shaileya, Shilabhava, Shiladadrú, Shilaprasuna, Shilapushpa, Shilasana, Shilottha, Shitala, Shitashiva, Sthavira, Subhaga, Vridha—; *Tamil:* Kalapu, Kalpasi—; *Telugu:* Rathapu, Ratipachi, Ratipanche—; *Urdu:* Habakkarmani, Rihankarmani—.

Fragrant, bitter; cooling, alexiteric, vulnerant, antipyretic; useful in diseases of the blood and the heart, biliousness, bronchitis, scabies, leprosy, enlarged spleen, burning sensations, bleeding piles, thirst, vomiting, asthma (Ayurveda).

Fragrant, astringent; laxative, tonic, alterative, carminative, aphrodisiac, detergent; useful in inflammations, stomach disorders, dyspepsia, vomiting pain in the liver and the uterus, amenorrhœa, vesicular calculus; powder applied to wounds, sores, boils; good cephalic snuff; smoke relieves headache (Yunani).

P. perlata is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

INDEX

INDEX

	Page.	Volume.
A		
abelmoschus (Hibiscus)	330	I.
Abies	2392—93	III.
Abroma	379—81	I.
abrotanoides (Perowskia)	1994	III.
Abrus	763—67	I.
absinthium (Artemisia)	1398	II.
absus (Cassia)	873	II.
Abutilon	313—18	I.
abyssinica (Guizotia)	1369	II.
Acacia	919—36	II.
Acalypha	2260—64	III.
Acampe	2410—11	IV.
AGANTHACEAE	1861—1911	III.
acanthocalyx (Eremostachys)	2026	III.
acanthopodium (Zanthoxylum)	461	I.
Acanthus	1874—76	III.
Acer	639—40	I.
acerifolia (Excoecaria)	2286	III.
acerifolium (Pterospermum)	374	I.
acetosa (Rumex)	2116	IV.
acetosella (Oxalis)	438	I.
„ (Rumex)	2115	III.
Achillea	1375—78	II.
Achras	1486—87	II.
Achyranthes	2065—69	III.
acida *var.* (Citrus medica)	489	I.
acinosa (Phytolacca)	2090	III.
acmella (Spilanthes)	1366	II.
acmophylla (Salix)	2363	III.
aconitifolius (Phaseolus)	798	I.
Aconitum	26—52	I.
Acorus	2626—30	IV.
acris (Pimenta)	1056	II.
Acronychia	471—72	I.
Actaea	23—24	I.
Actiniopteris	2745	IV.
Actinodaphne	2156	III.
aculeta (Lantana)	1914	III.
„ (Meconopsis)	132	I.
„ (Pisonia)	2048	III.
„ (Sesbania)	734	I.
acuminata (Tiliacora)	83	I.
acuta (Sida)	308	I.
acutangula (Barringtonia)	1058	II.
„ (Luffa)	1121	II.
acutifolia (Plumieria)	1561	II.
Adansonia	351—54	I.
Adenanthera	908—10	II.
adenanthus (Phaseolus)	799	I.

	Page.	Volume.
Adenia	1101—08	II.
Adhatoda	1899—1902	III.
Adiantum	2735—40	IV.
adiantum-nigrum (Asplenium)	2743	IV.
Adina	1253—54	II.
Adinobotrys	731—32	I.
adnata (Vitis)	606	I.
Adonis	10—11	I.
adscendens (Asparagus)	2501	IV.
Aegle	499—502	I.
aegyptiaca (Balanites)	512	I.
„ (Farsetia)	151	I.
„ (Luffa)	1120	II.
„ (Orobanche)	1835	III.
„ (Salvia)	1999	III.
„ (Sesbania)	732	III.
aegytiacum (Dactylocnemium)	2697	IV.
aequata (Leea)	620	I.
Aerva	2063—65	III.
Aesculus	625—28	I.
aestivalis (Adonis)	10	I.
aestivum (Triticum)	2700	IV.
aethiopicum (Adiantum)	2738	IV.
affine (Scaphium)	369	I.
affinis (Saussurea)	1423	II.
africana (Myrsine)	1477	II.
africanum (Trichodesma)	1693	III.
agallocha (Aquilaria)	2171	III.
„ (Commiphora)	528	I.
„ (Excoecaria)	2285	III.
Agaricus	2755—56	IV.
Agave	2465—68	IV.
Ageratum	1330—31	II.
aggregata (Lettsomia)	1709	III.
Aglaia	550—51	I.
agnus-castus (Vitex)	1942	III.
Agrimonia	977—78	II.
Agropyron	2698—99	IV.
Ailanthus	503—07	I.
Ajuga	2026—27	III.
ALANGIACEAE	1236—1239	II.
Alangium	1237—39	II.
alata (Cassia)	870	II.
„ (Dioscorea)	2490	IV.
„ (Naregamia)	535	I.
„ (Pterygota)	362	I.
„ (Swertia)	1667	III.
alatum (Geum)	971	II.
„ (Zanthoxylum)	460	I.
aletus (Dipterocarpus)	285	I.
„ (Tribulus)	424	I.
alba (Datura)	1790	III.

	Page	Volume.
alba (Eclipta) ..	1361	II.
„ (Melilotus) ..	705	I.
„ (Morus) ..	2308	III.
„ (Nymphæa) ..	111	I.
„ (Plumieria) ..	1564	II.
„ (Populus) ..	2370	III.
„ (Rosa)	982	II.
„ (Salix)	2365	III.
albicaule (Solanum) ..	1764	III.
albida (Crotalaria) ..	694	I.
albizzia	936—43	II.
album (Chenopodium) ..	2072	III.
„ (Santalum) ..	2186	III.
„ (Viscum) ..	2182	III.
albus (Dictamnus) ..	458	I.
Aleurites	2247—49	III.
ALGAE	2759	IV.
Alhagi	742—44	I.
alihugas (Alpinia) ..	2447	IV.
ALISMACEAE ..	2630—2631	IV.
Allamanda	1556—57	II.
Alliaria	151—52	I.
Allium	2509—17	IV.
Allophylus	628—29	I.
alnoides (Betula) ..	2356	III.
Alocasia	2616—19	IV.
Aloe	2504—06	IV.
aloifolia (Yucca) ..	2503	IV.
aloifolium (Cymbidium)	2406	IV.
Alpinia	2444—49	IV.
alsinoides (Evolvulus) ..	1738	III.
Alstonia	1565—69	II.
Alternanthera	2069—70	III.
Althaea	295—99	I.
Altingia	1007—08	II.
altissimum (Sisymbrium)	154	I.
Alysicarpus	752—53	I.
amada (Curcuma) ..	2422	IV.
amara (Albizzia) ..	941	II.
„ (Curanga) ..	1819	III.
„ *var.* (Luffa acutangula) ..	1123	II.
AMARANTHACEAE ..	2051—2070	III.
Amaranthus	2056—63	III.
AMARYLLIDACEAE ..	2465—2475	IV.
amboinicus (Coleus) ..	1970	III.
ambrosioides (Chenopodium) ..	2074	III.
americana (Agave) ..	2466	IV.
„ (Ximenia) ..	566	I.
Ammannia	1071—74	II.
Amomum	2431—35	IV.
Amoora	553—54	I.
Amorphophallus ..	2608—10	IV.
ampeloprasum (Allium)	2516	IV.
Amphicome	1851	III.
Amphilophis	2673—74	IV.
amplexicaule (Memecylon) ..	1066	II.
amplexicaulis (Plantago)	2038	III.
amygdalus (Prunus) ..	953	II.
amyleum (Triticum) ..	2702	IV.

	Page.	Volume.
ANACARDIACEAE ..	643—675	I.
Anacardium	656—59	I.
anacardium (Semecarpus) ..	667	I.
Anagallis	1473—75	II.
anagallis (Veronica) ..	1827	III.
Anamirta	80—83	I.
Ananas	2477—79	IV.
Anaphalis	1348—49	II.
anceps (Xyris) ..	2532	IV.
Andrachne	2216—17	III.
Andrographis	1884—86	III.
Aneilema	2537—38	IV.
Anemone	7—9	I.
Angelica	1214—15	II.
anguina (Trichosanthes)	1114	II.
angulata (Physalis) ..	1768	III.
angustata (Typha) ..	2595	IV.
angustifolia (Agave) ..	2468	IV.
„ (Cassia) ..	876	II.
„ (Curcuma) ..	2418	IV.
„ (Kaempferia)	2427	IV.
„ (Ouratea) ..	516	I.
„ (Swertia) ..	1666	III.
angustifolium (Jasminum)	1519	II.
„ (Memecylon)	1066	II.
Anisochilus	1971—72	III.
Anisomeles	2009—12	III.
Annona	66—70	I.
ANNONACEAE ..	60—73	I.
annua (Artemisia) ..	1401	II.
„ (Martynia) ..	1855	III.
annulare (Holostemma)	1619	III.
annuum (Capsicum) ..	1771	III.
annuus (Helianthus) ..	1370	II.
Anodendron	1589—90	II.
Anogeissus	1034—36	II.
anserina (Potentilla) ..	973	II.
anthelmintica (Hydnocarpus) ..	226	I.
anthelminticum (Centratherum) ..	1325	II.
anthelminticus (Polyporus) ..	2757	IV.
Anthemis	1378—79	II.
anthemoides (Cotula) ..	1387	II.
Anthocephalus ..	1250—52	II.
anthopogon (Rhododendron) ..	1463	II.
Antiaris	2333—35	III.
Antidesma	2238—40	III.
antidotale (Panicum) ..	2713	IV.
antidysenterica (Holarrhena) ..	1570	II.
antiquorum (Euphorbia) ..	2204	III.
apetalum (Calophyllum)	272	I.
aphaca (Lathyrus) ..	771	I.
Aphanamixis ..	551—53	I.
aphylla (Periploca) ..	1601	III.
„ (Tamarix) ..	249	I.
Apium	1199—1201	II.

Page. Volume.

APOCYNACEAE .. 1542—1591 II.
Aporosa .. .. 2250—51 III.
aquatica (Rotula) .. 1684 III.
Aquilaria .. .. 2170—72 III.
aquilina (Pteris) .. 2741 IV.
arabica (Acacia) .. 922 II.
„ (Coffea) .. 1293 II.
Arabidopsis .. .. 157—59 I.
Araceae .. .. 2597—2630 IV.
Arachis .. .. 753—55 I.
Aralia .. .. 1233—34 II.
ARALIACEAE .. 1232—1236 II.
araneosa (Vitis) .. 613 I.
arborea (Callicarpa) .. 1920 III.
„ (Careya) .. 1061 II.
„ (Gmelina) .. 1932 III.
„ (Osyris) .. 2189 III.
arborescens (Jasminum) 1518 II.
arboreum (Gossypium) 346 I.
„ (Rhododendron) 1460 II.
arbor-tristis
(Nyctanthes) .. 1526 II.
Ardisia .. .. 1483—84 II.
Areca .. .. 2546—50 IV.
arenaria (Maerua) .. 190 I.
Arenga .. .. 2552—55 IV.
Arganosma .. .. 1586—88 II.
Argemone .. .. 128—31 I.
argemone (Papaver) .. 125 I.
argentea (Celosia) .. 2053 III.
Argyreia .. .. 1706—08 III.
arietinum (Cicer) .. 768 I.
Arisaema .. .. 2602—05 IV.
aristata (Berberis) .. 102 I.
„ (Hygroryza) .. 2653 IV.
Aristolochia .. .. 2120—25 III.
ARISTOLOCHIACEAE 2117—2125 III.
arjuna (Terminalia) .. 1023 II.
armeniaca (Prunus) .. 956 II.
arnottiana (Ficus) .. 2331 III.
„ (Holigarna) 671 I.
arnottianum
(Cynanchum) .. 1621 III.
aromatica (Curcuma) .. 2419 IV.
„ (Homalomena) 2619 IV.
aromaticum (Amomum) 2434 IV.
Artabotrys .. .. 63—64 I.
Artanema .. .. 1817—18 III.
Artemisia .. .. 1391—1402 II.
Arthrocnemum .. 2081—82 III.
articulata (Indigofera) .. 716 I.
articulatum (Viscum) .. 2184 III.
articulatus (Cyperus) .. 2642 IV.
„ (Scirpus) .. 2645 IV.
Artocarpus .. .. 2335—40 III.
arundinacea (Bambusa) 2724 IV.
„ (Maranta) 2449 IV.
Arundinaceum
(Chlorophytum) .. 2509 IV.
arundinaceum
(Saccharum) .. 2665 IV.
arvense (Lithospermum) 1702 III.

Page. Volume.

arvensis (Anagallis) .. 1474 II.
„ (Convolvulus) 1735 III.
„ (Digera) .. 2055 III.
„ (Mentha) .. 1982 III.
„ (Ranunculus) 16 I.
„ (Sonchus) .. 1443 II.
ascalonicum (Allium) .. 2510 IV.
ASCLEPIADACEAE .. 1593—1641 III.
Asclepias .. .. 1611—13 III.
asiatica (Berberis) .. 105 I.
„ (Gmelina) .. 1934 III.
„ (Grewia) .. 388 I.
„ (Hydrocotyle) 1193 II.
„ (Toddalia) .. 465 I.
„ (Torenia) .. 1820 III.
asiaticum (Abutilon) .. 318 I.
„ (Crinum) .. 2471 IV.
„ (Sedum) .. 1002 II.
Asparagus .. .. 2498—2503 IV.
aspalathoides
(Indigofera) .. 710 I.
Asper (Sonchus) .. 1445 II.
„ (Streblus) .. 2304 III.
aspera (Achyranthes) .. 2066 III.
„ (Ehretia) .. 1681 III.
„ (Leucas) .. 2019 III.
„ (Tacca) .. 2476 IV.
asperrima (Ficus) .. 2322 III.
Asphodelus .. .. 2507—08 IV.
Aspidium .. .. 2746 IV.
aspleniifolia (Launaea) 1446 II.
Asplenium .. .. 2742—44 III.
Aster .. .. 1337—38 II.
Asteracantha .. .. 1863—65 III.
asteroides (Erigeron) .. 1339 II.
asthmatica (Tylophora) 1631 III.
Astragalus .. .. 736—40 I.
Asystasia .. .. 1891—92 III.
Atalantia .. .. 482—83 I.
Athyrium .. .. 2745 IV.
atriplicifolia
(Perowskia) .. 1994 III.
Atropa .. .. 1781—83 III.
atropurpureus
(Adinobotrys) .. 731 I.
attenuatum (Piper) .. 2135 III.
Atylosia .. .. 811 I.
aucheri (Gaillonia) .. 1302 II.
„ (Otostegia) .. 2016 III.
„ (Peucedanum) 1222 II.
aucheriana (Boucerosia) 1640 III.
„ (Pycnocycla) 1210 II.
augusta (Abroma) .. 380 I.
aurantiacum (Piper) .. 2136 III.
aurantium (Citrus) .. 491 I.
aurea (Cotula) .. 1387 II.
Auricularia .. .. 2758 IV.
auricularia (Oldenlandia) 1265 II.
auriculata (Ammannia) 1073 II.
„ (Cassia) .. 867 II.
„ (Millettia) 730 I.
auriculatum (Jasminum) 1524 II.

Page. Volume.
auriculatus (Strobilanthes) .. 1870 III.
australis (Celtis) .. 2294 III.
Avena .. .. 2685—87 IV.
Averrhoa .. .. 441—44 I.
Avicennia .. .. 1952—55 III.
aviculare (Polygonum) 2096 III.
avium (Prunus) .. 958 II.
axillaris (Cyanotis) .. 2540 IV.
Azadirachta .. .. 536—41 I.
azedarach (Melia) .. 542 I.
Azima .. .. 1540—42 II.

B

babylonica (Salix) .. 2365 III.
baccata (Taxus) .. 2383 III.
baccatus (Ochradenus) 204 I.
baccifera (Ammannia) .. 1072 II.
bacillaris (Cotoneaster) 991 II.
balanghas (Sterculia) .. 367 I.
Balanites .. .. 512—15 I.
balfourii (Aconitum) .. 40 I.
Baliospermum .. 2277—79 III.
balsamiflora (Blumea) .. 1343 II.
balsamina (Impatiens) .. 445 I.
„ (Momordica) 1132 II.
BALSAMINACEAE .. 444—447 I.
Bambusa .. .. 2724—27 IV.
banksiae (Rosa) .. 984 II.
barbadense (Gossypium) 348 I.
barbarum (Lycium) .. 178 III.
barbata (Polytoca) .. 2657 IV.
barbatum (Polygonum) 2100 III.
Barleria .. .. 1876—82 III.
barometz (Cibotium) .. 2733 IV.
Barringtonia .. .. 1056—61 II.
bartramia (Triumfetta) 395 I.
Basella .. .. 2086—88 III.
basilicum (Ocimum) .. 1961 III.
Bassia .. .. 1487—93 II.
batatas (Ipomoea) .. 1719 III.
Bauhinia .. .. 891—902 II.
beccabunga (Veronica) 1828 III.
Begonia .. .. 1170—71 II.
BEGONIACEAE .. 1169—1171 II.
Belamcanda .. .. 2464 IV.
belerica (Terminalia) .. 1017 II.
belladonna (Atropa) .. 1782 III.
bengalense (Canarium) 532 I.
bengalensis (Ficus) .. 2312 III.
„ (Meriandra) 1996 III.
benghalensis (Commelina) .. 2536 IV.
„ (Hiptage) .. 417 I.
Benincasa .. .. 1126—28 II.
benjamina (Ficus) .. 2314 III.
benthami (Macrotomia) 1696 III.
BERBERIDACEAE .. 100—108 I.
Berberis .. .. 101—06 I.
Berchemia .. .. 587 I.

Page. Volume.
bergamia *var.* (Citrus aurantium) .. 494 I.
Bergenia .. .. 993—94 II.
Bergia .. .. 252—53 I.
Beta .. .. 2076—77 III.
betle (Piper) .. .. 2131 III.
Betula .. .. 2354—56 III.
bialata (Terminalia) .. 1031 II.
bicalyculata (Peristrophe) .. 1910 III.
bicolor (Exacum) .. 1653 III.
Bidens .. .. 1372—74 II.
bidentata (Achyranthes) 2069 III.
bifida (Utricularia) .. 1837 III.
biflora (Oldenlandia) .. 1266 II.
„ (Viola) .. 211 I.
biflorus (Dolichos) .. 805 II.
bigaradia *var.* (Citrus aurantium) .. 493 I.
bigeminum (Pithecellobium) .. 945 II.
BIGNONIACEAE .. 1838—1853 III.
bignoniaceum (Jasminum) .. 1520 II.
bilimbi (Averrhoa) .. 443 I.
bilocularis (Vepris) .. 468 I.
Biophytum .. .. 440—41 I.
bipinnata (Desmostachya) 2688 IV.
„ (Lavandula) .. 1973 III.
Bischofia .. .. 2249—50 III.
bispinosa (Trapa) .. 1090 II.
biternatum (Pasmmogeton) 1231 II.
Bixa .. .. 216—18 I.
BIXACEAE .. .. 216—218 I.
Blastania .. .. 1163—64 II.
Blepharis .. .. 1872—74 III.
blitum (Amaranthus) .. 2062 III.
Blumea .. .. 1340—44 II.
Boehmeria .. .. 2344—45 III.
Boerhavia .. .. 2044—48 III.
Boletus .. .. 2758 IV.
BOMBACACEAE .. 351—360 I.
Bombax .. .. 354—57 I.
bona-nox (Calonyction) 1710 III.
Bongardia .. .. 108 I.
Bonnaya .. .. 1822—23 III.
BORAGINACEAE .. 1672—1702 III.
Borassus .. .. 2571—75 IV.
Borreria .. .. 1300—1302 II.
bosvaliia (Glossocardia) .. 1371 II.
Boswellia .. 520—23 I.
Botrychium .. .. 2752—58 IV.
botrys (Chenopodium) 2074 III.
Boucerosia .. .. 1640—41 III.
bourdilloni (Strychnos) 1649 III.
brachiata (Salicornia) .. 2082 III.
brachycarpa (Cleome) .. 183 I.
brachystachys (Chloranthus) .. 2138 III.
bracteata (Aristolochia) 2121 III.
bracteatum (Onosma) .. 1699 III.

Page. Volume.
bracteosa (Ajuga) .. 2026 III.
Bragantia .. .. 2118—19 III.
Brasenia .. .. 109—10 I.
Brassica .. .. 159—70 I.
brevifolium (Heliotropium) .. 1689 III.
brevistigma (Sarcostemma) .. 1622 III.
Breynia .. .. 2234—36 III.
Bridelia .. .. 2212—15 III.
BROMELIACEAE .. 2477—2479 IV.
Brucea .. .. 511—12 I.
Brunella .. .. 2006—07 III.
brunonianum (Delphinium) 22 I.
„ (Sarcostemma) 1623 III.
Bryonopsis .. .. 1158—59 II.
buchanani (Cryptolepis) 1599 III.
Buchanania .. .. 659—62 I.
budrunga (Zanthoxylum) 464 I.
Buettneria .. .. 383—84 I.
bulbifera (Dioscorea) .. 2485 IV.
bulbocastanum (Carum) 1203 II.
bulbosa (Ceropegia) .. 1637 III.
bunius (Antidesma) .. 2239 III.
Bupleurum .. .. 1197—99 II.
burhia (Crotalaria) .. 693 I.
burmanni (Drosera) .. 1005 II.
BURSERACEAE .. 519—533 I.
bursa-pastoris (Capsella) 171 I.
Butea .. .. 784—89 I.
butyracea (Bassia) .. 1492 II.
buxifolia *var.* (Cotoneaster microphylla) .. 992 II.
Buxus .. .. 2211—12 III.

C

cabulica (Salvia) .. 2000 III.
„ (Statice) .. 1471 II.
cacao (Theobroma) .. 383 I.
Caccinia .. .. 1700 III.
CACTACEAE .. 1173—1178 II.
Cadaba .. .. 193—95 I.
cadamba (Anthocephalus) 1251 II.
caeruleum (Delphinium) 21 I.
„ (Eryngium) 1196 II.
Caesalpinia .. .. 841—52 II.
CAESALPINIACEAE 839—902 II.
caesia (Acacia) .. 932 II.
„ (Curcuma) .. 2422 IV.
„ (Mangifera) .. 656 I.
Cajanus .. .. 809—11 I.
Calamintha .. .. 1992—93 III.
Calamus .. .. 2586—89 IV.
calamus (Acorus) .. 2626 IV.
calcarata (Alpinia) .. 2447 IV.
Calendula .. .. 1412—14 II.
calendulacea (Wedelia) 1364 II.
calisaya (Cinchona) .. 1260 II.
Callicarpa .. .. 1919—22 III.
Calligonum .. .. 2092—93 III.

Page. Volume.
callosus (Strobilanthes) 1869 III.
Calonyction .. .. 1710—12 III.
Calophyllum .. .. 270—74 I.
Calotropis .. .. 1606—11 III.
Caltha .. .. 17—18 I.
calycina (Arganosma) .. 1588 II.
„ (Kydia) .. 349 I.
Calycopteris .. .. 1033—34 II.
calyculata (Ventilaga) 586 I.
Camellia .. .. 278—80 I.
camelorum (Alhagi) .. 743 I.
CAMPANULACEAE .. 1451—1455 II.
campanulata (Gardenia) 1281 II.
„ (Ipomoea) 1725 III.
campanulatum (Rhododendron) .. 1461 II.
campanulatus (Amorphophallus) 2609 IV.
campechianum (Haematoxylon) .. 886 II.
campestris (Agaricus) .. 2755 IV.
„ (Brassica) .. 163 I.
„ (Eulophia) .. 2404 IV.
„ (Luzula) .. 2543 IV.
camphora (Cinnamomum) 2152 III.
cana (Callicarpa) .. 1922 III.
canadensis (Erigeron) 1339 II.
Canangium .. .. 65 I.
Canarium .. .. 530—33 I.
Canavalia .. .. 789—91 I.
candicans (Saussurea) 1419 II.
candolleana (Ceriops) 1012 II.
„ (Diospyros) 1506 II.
Canna .. .. 2450—52 IV.
cannabina (Datisca) .. 1172 II.
cannabinum (Eupatorium) 1332 II.
cannabinus (Hibiscus) .. 327 I.
Cannabis .. .. 2302—04 III.
Canscora .. .. 1658—60 III.
canum (Ocimum) .. 1960 III.
capillaceum (Foeniculum) 1211 II.
capillus-veneris (Adiantum) .. 2737 IV.
capitata (Malachra) .. 319 I.
capitellata (Micromeria) 1991 III.
CAPPARIDACEAE .. 181—201 I.
Capparis .. .. 195—201 I.
caprea (Salix) .. 2364 III.
CAPRIFOLIACEAE .. 1239—1244 II.
Capsella .. .. 171—73 I.
Capsicum .. .. 1769—73 III.
capsularis (Corchorus) 398 I.
Caralluma .. .. 1639—40 III.
carambola (Averrhoa) 442 I.
carandas (Carissa) .. 1546 II.
Carapa .. .. 557—59 I.
Cardamine .. .. 148—50 I.
cardamomum (Elettaria) 2442 IV.
Cardanthera .. .. 1862—63 III.
Cardiospermum .. 622—25 I.
Carduus .. .. 1416—17 II.
Careya .. .. 1061—63 II.

	Page.	Volume.
Carica	1097—99	II.
carica (Ficus)	2329	III.
CARICACEAE	1096—1100	II.
Carissa	1546—49	II.
carnosa (Vitis)	611	I.
carnosus (Anisochilus)	1971	III.
carota (Daucus)	1229	II.
Carthamus	1428—31	II.
Carum	1201—06	II.
carvi (Carum)	1201	II.
CARYOPHYLIACEAE	237—240	I.
Caryota	2556—60	IV.
Casearia	1093—96	II.
caseolaris (Sonneratia)	1082	II.
Cassia	854—79	II.
cassia (Cinnamomum)	2153	III.
cassumunar (Zingiber)	2439	IV.
Cassytha	2163—64	III.
Casuarina	2352—53	III.
CASUARINACEAE	2351—2353	III.
cataphracta (Flacourtia)	219	I.
catappa (Terminalia)	1016	II.
catechu (Acacia)	926	II.
„ (Areca)	2547	IV.
cathartica (Allamanda)	1556	II.
cathcarti (Pothos)	2625	IV.
catiang (Vigna)	800	I.
caudatum (Adiantum)	2736	IV.
caudatus (Croton)	2255	III.
cauliflora (Cynometra)	881	II.
Cedrela	562—64	I.
Cedrus	2390—92	III.
Ceiba	357—60	I.
ceiba (Bombax)	354	I.
CELASTRACEAE	570—583	I.
Celastrus	574—77	I.
Celosia	2052—55	III.
Celsia	1806—08	III.
Celtis	2294—96	III.
Centaurea	1427—28	II.
centifolia (Rosa)	981	II.
Centipeda	1388—89	II.
Centratherum	1325—27	II.
cepa (Allium)	2511	IV.
cephalotes (Leucas)	2017	III.
cerasoides (Prunus)	959	II.
cerasus (Prunus)	957	II.
Ceratonia	885—86	II.
CERATOPHYLLACEAE	2370—2372	III.
Ceratophyllum	2371—72	III.
Cerbera	1552—53	II.
cerifera (Copernicia)	2568	IV.
Ceriops	1011—12	II.
cernua (Brassica)	167	I.
Ceropegia	1636—38	III.
cerviana (Mollugo)	1186	II.
chaba (Piper)	2130	III.
chamelaea (Sebastiania)	2287	III.
chamomilla (Matricaria)	1383	II.
champaca (Michelia)	56	I.
chappar (Flemingia)	814	I.
charantia (Momordica)	1130	II.
chasmanthum (Aconitum)	30	I.
chebula (Terminalia)	1020	II.
Cheilanthes	2740—41	IV.
Cheiranthus	143—45	I.
cheiri (Cheiranthus)	144	I.
chelidonii (Cleome)	186	I.
CHENOPODIACEAE	2070—2089	III.
Chenopodium	2071—76	III.
chinense (Hypericum)	258	I.
„ (Polygonum)	2103	III.
chinensis (Belamcanda)	2464	IV.
„ (Cuscuta)	1743	III.
„ (Impatiens)	447	I.
„ (Litchi)	636	I.
„ (Litsea)	2158	III.
„ (Polygala)	233	I.
„ (Stenolema)	2734	IV.
„ *var.* (Brassica napus)	163	I.
chirata (Swertia)	1664	III.
CHLORANTHACEAE	2137—2138	III.
Chloranthus	2137—38	III.
Chlorophytum	2508—09	IV.
Chloroxylon	564—65	I.
chondrilloides (Launaea)	1448	II.
Chrozophora	2258—60	III.
Chrysanthemum	1379—82	II.
Chukrasia	560—61	I.
Cibotium	2733—34	IV.
Cicca	2227—28	III.
Cicer	767—69	I.
Cichorium	1433—36	II.
ciliaris (Nepeta)	2003	III.
ciliata (Plantago)	2043	III.
„ (Populus)	2368	III.
siliatus (Strobilanthes)	1871	III.
Cimicifuga	24	I.
Cinchona	1260—62	II.
cinerea (Dichrostachys)	912	II.
„ (Vernonia)	1322	II.
„ (Viola)	209	I.
cinnabarinum (Rhododendron)	1464	II.
cinnamomea (Celtis)	2295	III.
cinnamomifolia (Strychnos)	1649	III.
Cinnamomum	2144—55	III.
cirrhosa (Fritillaria)	2523	IV.
Cissampelos	94—98	I.
Cistanche	1834—35	III.
Citratus (Cymbopogon)	2681	IV.
citrifolia (Morinda)	1295	II.
citrina (Terminalia)	1023	II.
citriodora (Eucalyptus)	1044	II.
Citrullus	1146—51	II.
Citrus	483—96	I.
Clausena	475—78	I.
Cleistanthus	2215—16	III.
Clematis	3—7	I.
Cleome	181—86	

Page. Volume.
Clerodendron .. 1945—51 III.
clinopodioides (Ziziphora) .. 2028 III.
clinopodium (Calamintha) .. 1992 III.
Clitoria .. .. 802—04 I.
coagulans (Withania) .. 1777 III.
coca (Erythroxylon) .. 415 I.
coccinea (Ixora) .. 1283 II.
„ (Quamoclit) .. 1713 III.
coccinellifera (Opuntia) 1174 II.
coccineum (Zygophyllum) .. 425 I.
Coccinia .. .. 1151 II.
Cocculus .. .. 86—90 I.
cocculus (Anamirta) .. 81 I.
cochinchinense (Gymnopetalum) .. 1115 II.
cochinchinensis (Glycosmis) .. 470 I.
cochinchinensis (Momordica) .. 1135 II.
Cochlearia .. .. 177 I.
COCHLOSPERMACEAE 214—215 I.
Cochlospermum .. 214—15 I.
Cocos .. .. 2580—86 IV.
Codonopsis .. .. 1454—55 II.
Coffea .. .. 1292—93 II.
Coix .. .. 2654—56 IV.
Colchicum .. .. 2524—25 IV.
Coldenia .. .. 1683—84 III.
Colebrookea .. .. 1977—78 III.
Coleus .. .. 1970—71 III.
collinus (Cleistanthus) 2215 III.
Colocasia .. .. 2613—16 IV.
colocynthis (Citrullus) .. 1147 II.
colona (Echinochloa) .. 2715 IV.
colorata (Ardisia) .. 1483 II.
colubrina (Strychnos) .. 1644 III.
colurna (Corylus) .. 2359 III.
Colutea .. .. 721—22 I.
COMBRETACEAE .. 1013—1038 II.
Commelina .. .. 2533—37 IV.
COMMELINACEAE .. 2532—2541 IV.
commelinifolia (Habenaria) .. 2414 IV.
Commiphora .. 525—29 I.
commune (Canarium) .. 531 I.
communis (Juniperus) .. 2380 III.
„ (Myrtus) .. 1040 II.
„ (Prunus) .. 960 II.
„ (Pyrus) .. 988 II.
„ (Ricinus) .. 2274 III.
composita (Melia) .. 545 I.
COMPOSITAE .. 1313—1449 II.
compressum (Pennisetum) 2708 IV.
concanensis (Moringa) 682 I.
conferta (Smithia) .. 746 I.
congesta (Flemingia) .. 815 I.
CONIFERAE .. 2376—2393 III.
CONNARACEAE .. 683—686 I.
Connarus .. .. 685—86 I.

Page. Volume.
contortus (Hettropogon) 2684 IV.
CONVOLVULACEAE 1702—1743 III.
Convolvulus .. .. 1734—37 III.
conyzoides (Ageratum) 1330 II.
Copernicia .. .. 2567—70 IV.
copticum (Carum) .. 1204 II.
Coptis .. .. 18—19 I.
coracana (Eleusine) .. 2692 IV.
Corallocarpus .. 1166—67 II.
corchorifolia (Melochia) 378 I.
Corchorus .. .. 397—403 I.
cordata (Daemia) .. 1618 III.
„ (Trichosanthes) 1109 II.
cordatus (Sarcocephalus) 1250 II.
Cordia .. .. 1674—81 III.
cordifolia (Adina) .. 1253 II.
„ (Andrachne) 2217 III.
„ (Crambe) .. 178 I.
„ (Rubia) .. 1303 II.
„ (Sida) .. 312 I.
„ (Tinospora) .. 77 I.
coriacea (Terminalia) .. 1032 II.
Coriandrum .. .. 1224—27 II.
Coriaria .. .. 675—76 I.
CORIARIACEAE .. 675—676 I.
coriaria (Caesalpinia) .. 851 II.
cornea (Garcinia) .. 267 I.
corniculata (Oxalis) .. 437 I.
„ (Trigonella) 702 I.
cornuta (Prunus) .. 962 II.
coromandeliana (Celsia) 1807 III.
„ (Urginea) 2519 IV.
coromandelianum (Malvastrum) .. 304 I.
coronaria (Ervatamia) .. 1577 II.
coronarium (Chrysanthemum) .. 1381 II.
Corydalis .. .. 135—37 I.
corylifolia (Psoralea) .. 718 I.
Corylus .. .. 2359—60 III.
corymbosa (Oldenlandia) 1263 II.
„ (Polycarpea) 239 I.
Corypha .. .. 2570—71 IV.
Coscinium .. .. 84—86 I.
Cosmostigma .. .. 1633—34 III.
costatum (Amomum) .. 2434 IV.
Costus .. .. 2440—42 IV.
Cotoneaster .. .. 990—92 II.
Cotula .. .. 1386—87 II.
courtallica (Barleria) .. 1881 III.
cowa (Garcinia) .. 267 I.
Crambe .. .. 177—78 I.
crassifolium (Lepidium) 175 I.
CRASSULACEAE .. 997—1003 II.
crataegoides (Symplocos) 1510 II.
Crataeva .. .. 190—93 I.
crenulata (Laportea) .. 2343 III.
„ (Limonia) .. 478 I.
crepitans (Hura) .. 2288 III.
Crescentia .. .. 1852—53 III.
Cressa .. .. 1739—40 III.
cretica (Cressa) .. 1739 III.

Page. Volume.
cretica (Fagonia) .. 426 I.
crinita (Osbeckia) .. 1070 II.
Crinum .. .. 2470—74 IV.
crispa (Leea) .. 618 I.
„ (Pulicaria) .. 1354 II.
„ (Tinospora) .. 76 I.
crista (Caesalpinia) .. 842 II.
cristata (Barleria) .. 1879 III.
„ (Lepidagathis) 1893 III.
„ *var.* (Celosia argentea) .. 2054 III.
cristatum (Limnanthemum) 1668 III.
crocatus (Boletus) .. 2758 IV.
Crocus .. .. 2462—63 IV.
Crossandra .. .. 1890—91 III.
Crotalaria .. .. 691—98 I.
crotalarioides (Polygala) 232 I.
Croton .. .. 2252—57 III.
CRUCIFERAE .. 140—180 I.
crus-galli (Echinochloa) 2716 IV.
Cryptocoryne .. .. 2598—2600 IV.
CRYPTOGAMIA .. 2730 IV.
Cryptolepis .. .. 1598—99 III.
Cryptostegia .. .. 1600—01 III.
cucullata (Amoora) .. 553 I.
cucumerina (Trichosanthes) .. 1112 II.
Cucumis .. .. 1138—46 II.
Cucurbita .. .. 1154—58 II.
CUCURBITACEAE .. 1104—1169 II.
cujete (Crescentia) .. 1853 III.
Cuminum .. .. 1227—28 II.
cuneifolia (Ixora) .. 1289 II.
„ (Moniera) .. 1816 III.
„ (Taverniera) 740 I.
cunia (Ficus) .. 2324 III.
Cupressus .. .. 2378—79 III.
CUPULIFERAE .. 2353—2360 III.
Curanga .. .. 1819 III.
curassavica (Asclepias) 1612 III.
curcas (Jatropha) .. 2244 III.
Curculigo .. .. 2469—70 IV.
Curcuma .. .. 2417—26 IV.
curtisii (Melanorrhoea) 663 I.
Cuscuta .. .. 1740—43 III.
cuspidata (Olea) .. 1533 II.
Cyamopsis .. .. 705—07 I.
Cyanotis .. .. 2538—40 IV.
CYCADACEAE .. 2395—2397 IV.
Cycas .. .. 2395—97 IV.
Cydonia .. .. 984—86 II.
Cylista .. .. 812—13 I.
Cymbidium .. .. 2406 IV.
Cymbopogon .. .. 2675—83 IV.
cyminum (Cuminum) .. 1227 II.
cymosum (Fagopyrum) 2105 III.
cynanchoides (Pentatropis) .. 1613 III.
Cynanchum .. .. 1620—21 III.
Cynodon .. .. 2689—92 IV.
Cynoglossum .. .. 1695—96 III.
Cynometra .. .. 800—881 II.

Page. Volume.
CYPERACEAE .. 2632—2647 IV.
Cyperus .. .. 2636—44 IV.
Cyrtophyllum .. 1650 III.

D

dactylifera (Phoenix) .. 2561 IV.
Dactyloctenium .. 2696—98 IV.
dactylon (Cynodon) .. 2689 IV.
Daedalacanthus .. 1867—69 III.
Daemia .. .. 1618 III.
dahurica (Gentiana) .. 1663 III.
dahuricus (Rhamnus) .. 597 I.
Dalbergia .. .. 817—25 I.
dalhousiae (Ficus) .. 2331 III.
damascena (Rosa) .. 980 II.
Daphne .. .. 2167—68 III.
dasysperma (Ipomoea) .. 1728 III.
Datisca .. .. 1171—73 II.
DATISCACEAE .. 1171—1173 II.
Datura .. .. 1783—92 III.
Daucus .. .. 1228—31 II.
debile (Equisetum) .. 2754 IV.
decandra (Trianthema) 1182 II.
decemfidum (Melastoma) 1069 II.
decidua (Capparis) .. 197 I.
decumbens (Gentiana) 1662 III.
decussata (Canscora) .. 1659 III.
„ (Swertia) .. 1666 III.
defixum (Crinum) .. 2473 IV.
deinorrhizum (Aconitum) 38 I.
Delonix .. .. 852—53 I.
delphinifolia (Sopubia) 1831 III.
Delphinium .. .. 20—23 I.
demersum (Ceratophyllum) .. 2371 III.
Dendrobium .. .. 2402—03 IV.
Dendrocalamus .. 2727—29 IV.
densiflora (Blumea) .. 1342 II.
„ (Randia) .. 1276 II.
densiflorus (Senecio) .. 1411 II.
dentatus (Rumex) .. 2113 III.
denudata (Alocasia) .. 2618 IV.
denudatum (Delphinium) 20 I.
deodara (Cedrus) .. 2390 III.
depressus (Corchorus) .. 402 I.
Derris .. .. 832—35 I.
Descurainia .. .. 155—57 I.
Desmodium .. .. 756—63 I.
Desmostachya .. 2687—89 IV.
Desmotrichum .. 2400—02 IV.
dhana (Peucedanum) .. 1221 II.
dichotoma (Actiniopteris) 2745 IV.
„ (Arganosma) 1587 II.
„ (Ervatamia) 1575 II.
„ (Hoppea) .. 1658 III.
„ *var.* (Barleria cristata) .. 1880 III.
Dichroa .. .. 994—95 II.
Dichrostachys .. 912—13 II.
dicksonii (Pinanga) .. 2552 IV.

	Page.	Volume.
Dicliptera	1909—10	III.
Dicoma	1431—33	II.
Dictamnus	458—59	I.
didyma (Plectronia) ..	1283	II.
diffusa (Boerhavia) ..	2045	III.
„ (Canscora) ..	1659	III.
„ (Oldenlandia)	1267	II.
„ (Viola) ..	209	I.
Digera	2055—56	III.
digitata (Adansonia) ..	352	I.
„ (Ipomoea) ..	1717	III.
digyna (Caesalpinia) ..	851	II.
„ (Oxyria) ..	2110	III.
Dillenia	53	I.
DILLENIACEAE ..	52—54	I.
dillenii (Opuntia) ..	1176	II.
dioica (Momordica) ..	1133	II.
„ (Olea) ..	1535	II.
„ (Tamarix) ..	248	I.
„ (Trichosanthes)	1110	II.
„ (Urtica) ..	2341	III.
Dioscorea	2480—90	IV.
DIOSCOREACEAE ..	2479—2490	IV.
Diospyros	1499—1509	II.
diphylla (Zornia) ..	745	I.
DIPTEROCARPACEAE	281—293	I.
Dipterocarpus ..	282—87	I.
dissecta (Ipomoea) ..	1727	III.
disticha (Cicca) ..	2227—28	III.
„ (Wallichia) ..	2556	IV.
divaricata (Valutarella)	1426	II.
diversifolia (Pimpinella)	1208	II.
Dodonaea	640—43	I.
dolabriformis (Xylia) ..	905	II.
Dolichandrone ..	1842—44	III.
Dolichos	804—07	I.
domestica (Prunus) ..	961	II.
Doronicum	1404—05	II.
draba (Lepidium) ..	175	I.
Dracocephalum ..	2004—05	III.
dracunculoides (Euphorbia) ..	2208	III.
dracunculus (Artemisia)	1401	II.
Dregea	1634—36	III.
Drosera	1004—06	II.
DROSERACEAE ..	1003—1006	II.
Drynaria	2747	IV.
dubium (Papaver) ..	124	I.
dulcamara (Solanum) ..	1751	III.
dulce (Pithecellobium)	946	II.
dulcis (Garcinia) ..	266	I.
„ (Scoparia) ..	1823	III.
„ (Uvaria) ..	62	I.
dumetorum (Randia) ..	1273	II.
durum (Triticum) ..	2702	III.
dysenterica (Pulicaria)	1354	II.
Dysoxylum	547—48	I.
E		
EBENACEAE ..	1498—1509	II.
ebenum (Diospyros) ..	1507	II.

	Page.	Volume.
ebulus (Sambucus) ..	1241	II.
Ecbolium	1904—05	III.
echinata (Luffa) ..	1125	II.
echinatus (Echinops) ..	1415	II.
Echinochloa	2714—17	IV.
Echinops	1414—16	II.
echioides (Andrographis)	1886	III.
„ (Onosma) ..	1698	III.
Eclipta	1360—63	II.
edulis (Blepharis) ..	1872	III.
„ (Caralluma) ..	1639	III.
„ (Passiflora) ..	1103	II.
Ehretia	1681—83	III.
eichwaldi (Heliotropium)	1686	III.
ELAEAGNACEAE ..	2173—2178	III.
Elaeagnus	2173—76	III.
Elaeis	2577	IV.
Elaeocarpus	403—06	I.
Elaeodendron	579—81	I.
elasticus (Loranthus) ..	2180	III.
elata (Delonix) ..	852	II.
ELATINACEAE ..	251—253	I.
elatum (Calophyllum) ..	273	I.
„ (Delphinium) ..	22	I.
elegans (Myricaria) ..	250	I.
„ (Roylea) ..	2014	III.
elengi (Mimusops) ..	1494	II.
elephantina (Typha) ..	2595	IV.
Elephantopus ..	1328—30	II.
elephantum (Feronia) ..	496	I.
Elettaria	2442—44	IV.
Eleusine	2692—94	IV.
elliptica (Derris) ..	834	I.
„ (Nepeta) ..	2002	III.
elwesii (Aconitum) ..	50	I.
Embelia	1477—81	II.
emblica (Phyllanthus)	2220	III.
emetica (Secamone) ..	1602	III.
Emicostemma ..	1655—56	III.
Emilia	1405—06	II.
emodi (Amphicome) ..	1851	III.
„ (Paeonia) ..	25	I.
„ (Podophyllum) ..	107	I.
„ (Rheum) ..	2108	III.
endivia (Cichorium) ..	1435	II.
Enhydra	1359—60	II.
enneaphylla (Indigofera)	709	I.
enneaspermum (Ionidium) ..	212	I.
ensata (Iris) ..	2460	IV.
ensiformis (Canavalia)	790	I.
Entada	906—08	II.
Ephedra	2372—74	III.
epigaeus (Corallocarpus)	1166	II.
EQUISETACEAE ..	2753—2754	IV.
equisetifolia (Casuarina)	2352	III.
Equisetum	2754	IV.
erecta (Tagetes) ..	1385	II.
Eremostachys ..	2025—26	III.
eriantha (Blumea) ..	1342	II.
ERICACEAE ..	1455—1464	II.
Erigeron	1338—40	II.

	Page.	Volume.
Eriobotrya	989—90	II.
eriocephalus (Lasiosiphon) ..	2170	III.
Eriolaena	377—78	I.
Eruca	170—71	I.
Ervatamia	1574—78	II.
Erycibe	1704—05	III.
Eryngium	1196—97	II.
Erythraea	1656—57	III.
Erythrina	781—84	I.
ERYTHROXYLACEAE	413—416	I.
Erythroxylon ..	414—16	I.
esculenta (Casearia) ..	1094	II.
„ (Colocasia) ..	2614	IV.
„ (Lens) ..	741	I.
„ (Premna) ..	1930	III.
esculentum (Fagopyrum)	2106	III.
„ (Oxystelma)	1604	III.
esculentus (Cyperus) ..	2640	IV.
„ (Hibiscus) ..	332	I.
Eucalyptus	1043—45	II.
Eugenia	1048—55	II.
Eulophia	2403—05	III.
Euonymus	572—73	I.
eupatoria (Agrimonia)	977	II.
Eupatorium	1331—34	II.
Euphorbia	2194—2210	III.
EUPHORBIACEAE ..	2190—2290	III.
euphratica (Populus) ..	2369	III.
europaea (Olea) ..	1534	II.
europaeus (Lycopus) ..	1983	III.
Euryale	115—16	I.
Eurycoma	512	I.
Evodia	450—52	I.
Evolvulus	1737—39	III.
Exacum	1652—55	III.
excavata (Clausena) ..	476	I.
excelsa (Ailanthus) ..	505	I.
„ (Altingia) ..	1007	II.
„ (Pinus) ..	2389	III.
excelsior (Fraxinus) ..	1530	II.
excelsum (Hymenodictyon) ..	1258	II.
Excoecaria	2284—87	III.
extensa (Pergularia) ..	1616	III.

F

	Page.	Volume.
Fagonia	426—28	I.
Fagopyrum	2105—07	III.
Fagraea	1642—43	III.
falcata (Dolichandrone)	1844	III.
falcatum (Asplenium) ..	2744	IV.
„ (Bupleurum) ..	1198	II.
falcatus (Loranthus)	2180	III.
„ (Ranunculus ..	17	I.
falconeri (Aconitum) ..	42	I.
farfara (Tussilago) ..	1402	II.
farinosa (Cadaba) ..	193	I.
farnesiana (Acacia) ..	920	II.
Farsetia	150—51	I.
fascicularis (Corchorus)	401	I.
fasciculata (Tylophora)	1631	III.
fastuosa (Datura) ..	1788	III.
fatua (Avena) ..	2686	IV.
febrifuga (Dichroa) ..	995	II.
„ (Soymida) ..	559	I.
febrifugum (Gymnostachyum)	1889	III.
felina (Cleome) ..	185	I.
fenestratum (Coscinium) ..	84	I.
Feronia	496—98	I.
ferox (Aconitum) ..	47	I.
„ (Euryale) ..	115	I.
„ (Solanum) ..	1754	III.
ferrea (Mesua) ..	274	I.
ferruginea (Acacia) ..	928	II.
Ferula	1215—18	II.
FICOIDACEAE ..	1178—1187	II.
Ficus	2309—33	III.
Filices	2730	IV.
filicinus (Asparagus) ..	2498	IV.
filiformis (Cassytha) ..	2163	III.
filix-foemina (Athyrium)	2745	IV.
fimbriatum (Desmotrichum) ..	2401	IV.
Fimbristylis	2635—36	IV.
fistula (Cassia) ..	856	II.
fistulosus *var.* (Citrullus vulgaris) ..	1151	II.
flabellifer (Borassus) ..	2571	IV.
flabellulatum (Adiantum)	2740	IV.
Flacourtia	219—23	I.
FLACOURTIACEAE ..	218—228	I.
Flagellaria	2542—43	IV.
FLAGELLARIACEAE	2541—2543	IV.
flava (Cochlearia) ..	177	I.
Flemingia	813—17	I.
flsxuosum (Lygodium) ..	2748	IV.
floribunda (Calycopteris)	1033	II.
„ (Fravinus) ..	1529	II.
florida (Gardenia) ..	1282	II.
Floscopa	2540—41	IV.
flos-reginae (Lagerstroemia) ..	1080	II.
fluctuans (Enhydra) ..	1360	II.
Flueggea	2230—33	III.
Foeniculum	1210—13	II.
foenum-graecum (Trigonella) ..	700	I.
foetida (Cimicifuga) ..	24	I.
„ (Paederia) ..	1297	II.
„ (Passiflora) ..	1103	II.
„ (Salsola) ..	2086	III.
„ (Sterculia) ..	384	I.
foetidum (Viburnum) ..	1243	II.
foliolosum (Thalictrum)	9	I.
fontanum (Nasturtium)	145	I.
fragarioides (Potentilla)	975	II.
fragrans (Myristica) ..	2141	III.
fragrans (Trachelospermum)	1588	II.

Page. Volume.

fragrantissima (Gaultheria) .. 1457 II.
Frankenia .. .. 236—37 I.
FRANKENIACEAE .. 235—237 I.
fraxinifolia (Evodia) .. 451 I.
Fraxinus .. .. 1529—30 II.
Fritillaria .. .. 2522—24 IV.
frumentacea *var.* (Echinochloa colona) 2715 IV.
frutescens (Capsicum) 1770 III.
„ (Ichnocarpus) 1591 II.
„ (Scaevola) .. 1450 II.
fruticans (Nipa) .. 2590 IV.
fruticosa (Acalypha) .. 2261 III.
„ (Potentilla) .. 974 II.
„ (Suaeda) .. 2083 III.
„ (Woodfordia) 1074 II.
fruticosum (Nothopanax) 1234 II.
fruticosus (Rubus) .. 968 II.
fruticulosum (Tanacetum) .. 1390 II.
fulgens (Argyreia) .. 1708 III.
Fumaria .. .. 137—40 I.
FUMARIACEAE .. 134—140 I.
FUNGI .. .. 2755—2758 IV.
furcatus (Hibiscus) .. 326 I.

G

Gaillonia .. .. 1302—03 II.
galanga (Alpinia) .. 2445 IV.
„ (Kaempferia) 2426 IV.
gallica (Rosa) .. 982 II.
gambir (Uncaria) .. 1257 II.
gangetica (Asystasia) .. 1892 III.
gangeticum (Desmodium) 758 I.
gangeticus (Amaranthus) 2059 III.
ganitrus (Elaeocarpus) .. 404 I.
garcini (Blastania) .. 1164 II.
Garcinia .. .. 259—68 I.
Gardenia .. .. 1277—82 II.
Garuga .. .. 523—25 I.
Gastrochilus .. .. 2428—29 IV.
Gaultheria .. .. 1456—58 II.
gayana (Anthemis) .. 1379 II.
gendarussa (Justicia) .. 1896 III.
Geniosporum .. 1968—69 III.
Gentiana .. .. 1660—63 III.
GENTIANACEAE .. 1651—1671 III.
GERANIACEAE .. 429—435 I.
Geranium .. .. 429—35 I.
gerardiana (Ephedra) .. 2373 III.
„ (Pinus) .. 2388 III.
germanica (Myricaria) .. 251 I.
Geum .. .. 969—71 II.
gibbosa (Ficus) .. 2311 III.
Giesekia .. .. 1187—88 II.
gigantea (Calotropis) .. 1607 III.
„ (Mucuna) .. 777 I.
giganteum (Lilium) .. 2521 IV.
Girardinia .. .. 2298—99 III.

Gironniera .. .. 2297—98 III.
glaberrima (Tricholepsis) 1425 II.
glabra (Boswellia) .. 523 I.
„ (Glycyrrhiza) .. 727 I.
„ (Indigofera) .. 717 I.
„ (Pongamia) .. 830 I.
„ (Smilax) .. 2495 IV.
„ (Stephania) .. 94 I.
glabrata (Mussaenda) 1270 II.
„ (Vitex) .. 1941 III.
glabrum (Polygonum) .. 2098 III.
glandulifera (Jatropha) 2241 III.
„ (Olea) .. 1534 II.
glanduliferum, (Cinnamomum) .. 2151 III.
glandulosa (Ailanthus) 504 I.
„ (Indigofera) 709 I.
glauca (Angelica) .. 1214 II.
„ (Caccinia) .. 1700 III.
„ (Cassia) .. 872 II.
„ (Leucaena) .. 914 II.
„ (Lonicera) .. 1244 II.
glaucum (Abutilon) .. 317 I.
„ (Elaeodendron) 580 I.
glaucus (Pericampylus) 91 I.
globosa *var.* (Dioscorea alata) .. .. 2490 IV.
globulus (Eucalyptus) .. 1044 II.
glochidiatum (Cynoglossum) .. 1696 III.
Glochidion .. .. 2228—30 III.
glomerata (Ficus) .. 2327 III.
„ (Launaea) .. 1448 II.
„ (Polygala) .. 234 I.
glomeratus (Convolvulus) 1736 III.
glomerulosa (Nepeta) .. 2004 III.
Gloriosa .. .. 2525—28 IV.
gloriosa (Yucca) .. 2503 IV.
Glossocardia .. .. 1371—72 II.
Glossogyne .. .. 1374—75 II.
Glossonema .. .. 1603—04 III.
Glycine .. .. 773—74 I.
Glycosmis .. .. 469—70 I.
Glycyrrhiza .. .. 727—29 I.
Gmelina .. .. 1931—35 III.
Gnaphalium .. .. 1349—51 II.
GNETACEAE .. 2372—2376 III.
Gnetum .. .. 2374—76 III.
gonoclados (Asparagus) 2501 IV.
GOODENIACEAE .. 1449—1451 II.
Gordonia .. .. 280—81 I.
gossypifolia (Jatropha) .. 2247 III.
Gossypium .. .. 343—49 I.
gossypium (Cochlospermum) 214 I.
Gouania .. .. 600—02 I.
gouriana (Clematis) .. 6 I.
govaniana (Corydalis) .. 136 I.
gracile (Tanacetum) .. 1390 II.
gracilipes (Solanum) .. 1763 III.
grahamiana (Flemingia) 815 I.

	Page.	Volume.
GRAMINEAE	2647—2729	IV.
gramineus (Acorus)	2629	IV.
granatum (Punica)	1084	II.
grande (Peucedanum)	1221	II.
grandiflora (Cryptostegia)	1600	III.
„ (Notonia)	1407	II.
„ (Sesbania)	735	I.
grandiflorum (Jasminum)	1522	II.
grandis (Capparis)	199	I.
„ (Lannea)	664	I.
„ (Tectona)	1924	III.
Grangea	1335—37	II.
grantioides (Inula)	1353	II.
granularis (Manisuris)	2669	IV.
granulata (Euphorbia)	2209	III.
Graptophyllum	1905—06	III.
gratioloides (Limnophila)	1814	III.
gratissima (Limnophila)	1813	III.
gratissimum (Ocimum)	1964	III.
graveolens (Apium)	1199	II.
„ (Casearia)	1093	II.
„ (Clematis)	6	I.
„ (Inula)	1352	II.
„ (Peucedanum)	1219	II.
„ (Ruta)	453	I.
Grewia	385—95	I.
griffithii (Illicium)	60	I.
„ (Sophora)	837	I.
grossus (Scirpus)	2644	IV.
Guazuma	381—82	I.
guineensis (Elaeis)	2578	IV.
Guizotia	1368—69	II.
gummifer (Gardenia)	1279	II.
guttatum (Sauromatum)	2606	IV.
GUTTIFERAE	258—276	I.
guyava (Psidium)	1046	II.
Gymnema	1624—27	III.
Gymnopetalum	1115—16	II.
Gymnosporia	577—79	I.
Gymnostachyum	1888—89	III.
gynandra (Gynandropsis)	187	I.
Gynandropsis	187—89	I.
Gynocardia	223—24	I.

H

Habenaria	2413—15	IV.
Haematoxylon	886	II.
HAEMODORACEAE	2456—2458	IV.
halepense (Sorghum)	2721	IV.
halicacabum (Cardiospermum)	623	I.
Haloxylon	2088—89	III.
HAMAMELIDACEAE	1006—1008	II.
Hamiltonia	1299—1306	II.
hamiltoniana (Lepidagathis)	1895	III.
hamiltonianum (Zanthoxylum)	463	I.
hamiltonii (Dysoxylum)	547	I.
(Farsetia)	150	I.

	Page.	Volume.
hamosa (Uraria)	752	I.
hamosus (Astragalus)	738	I.
Haplanthus	1886—88	III.
Hardwickia	881—82	II.
hardwickii (Valeriana)	1312	II.
harmala (Peganum)	456	I.
Hedera	1234—36	II.
hederacea (Ipomoea)	1716	III.
Hedychium	2429—31	IV.
Helianthus	1369—71	II.
Helicteres	370—72	I.
helioscopia (Euphorbia)	2207	III.
Heliotropium	1685—91	III.
helix (Hedera)	1235	II.
Helminthostachys	2751—52	IV.
Hemidesmus	1596—98	III.
hemispherica (Eugenia)	1055	II.
heptaphylla (Cleome)	186	I.
Heracleum	1223	II.
herbacea (Buettneria)	384	I.
„ (Oldenlandia)	1265	II.
„ (Premna)	1931	III.
herbaceum (Gossypium)	344	I.
Hernandia	2165—66	III.
HERNANDIACEAE	2165—2166	III.
hernandifolia (Stephania)	92	I.
heterandra (Garcinia)	268	I.
Heterophragma	1845—46	III.
heterophylla (Ficus)	2321	III.
„ (Lasia)	2623	IV.
„ (Melothria)	1162	II.
heterophyllum (Aconitum)	34	I.
Heteropogon	2683—85	IV.
hexandra (Mimusops)	1496	II.
Heynea	555—57	I.
heyneana (Capparis)	197	I.
„ (Ervatamia)	1576	II.
„ (Pimpinella)	1207	II.
heyneanum (Pterospermum)	375	I.
Hibiscus	325—40	I.
hippocastanum (Aesculus)	627	I.
Hippomane	2290	III.
Hippophae	2176—78	III.
Hiptage	417—18	I.
hirsuta (Artocarpus)	2336	III.
„ (Grewia)	391	I.
hirsutum (Gossypium)	348	I.
hirsutus (Cocculus)	86	I.
hirta (Euphorbia)	2197	III.
„ (Grewia)	391	I.
„ (Mollugo)	1183	II
hirtum (Abutilon)	316	I
hispida (Acalypha)	2263	III.
„ (Benincasa)	1127	II.
„ (Benincaca)	1127	II.
„ (Borreria)	1301	II.
„ (Ficus)	2322	III.
„ (Ipomoea)	1728	III.
hohenackeri (Glochidion)	2229	III.

Page. Volume.
Holarrhena .. .. 1569—74 II.
Holigarna .. .. 671—72 I.
Holoptelea .. .. 2292—94 III.
Holostemma .. .. 1618—20 III.
Homalomena .. .. 2619—20 IV.
Homonoia .. .. 2272—73 III.
hookeri (Actinodaphne) 2156 III.
„ (Doronicum) .. 1404 II.
Hopea .. .. 291 I.
Hoppea .. .. 1657—58 III.
Hordeum .. .. 2702—04 IV.
hortensis (Elaeagnus) .. 2174 III.
Hugonia .. .. 412—13 I.
Humboldtia .. .. 891 II.
humifusum (Hypericum) 256 I.
humilis (Ardisia) .. 1484 II.
Humulus .. .. 2300—01 III.
Hura .. .. 2288 III.
hyalina (Cuscuta) .. 1742 III.
hybridum (Papaver) .. 125 I.
Hydnocarpus .. 224—27 I.
HYDROCHARITACEAE 2397—2398 IV.
Hydrocotyle .. .. 1192—96 II.
Hydrolea .. .. 1671—72 III.
HYDROPHYLLACEAE 1671—1672 III.
hydropiper (Polygonum) 2100 III.
Hygroryza .. .. 2653—54 IV.
Hymenocrater .. 2029—30 III.
Hymenodictyon .. 1258—60 II.
Hyoscyamus .. .. 1794—98 III.
Hypecoum .. .. 133—34 I.
HYPERICACEAE .. 253—258 I.
hypericifolia (Euphorbia) 2196 III.
Hypericum .. .. 253—58 I.
hypogaea (Arachis) .. 753 I.
hypoleuca (Saussurea) .. 1420 II.
Hyptis .. .. 2032—33 III.
Hyssopus .. .. 1989—91 III.

I

ICACINACEAE .. 569—570 I.
Ichnocarpus .. .. 1590—92 II.
igniarius (Agaricus) .. 2756 IV.
ilicifolius (Acanthus) .. 1875 III.
Illicium .. .. 59—60 I.
Impatiens .. .. 445—47 I.
impatiens (Cardamine) 149 I.
imperialis (Fritillaria) .. 2522 IV.
incana (Matthiola) .. 143 I.
„ (Quercus) .. 2357 III.
incanum (Solanum) ... 1765 III.
indica (Acalypha) .. 2262 III.
„ (Aesculus) .. 626 I.
„ (Alocasia) .. 2616 IV.
„ (Anisomeles) .. 2010 III.
„ (Aristolochia) .. 2122 III.
„ (Azadirachta) .. 536 I.
„ (Canna) .. 2450 IV.
„ (Coccinia) .. 1151 II.
„ (Dillenia) .. 53 I.
indica (Drosera) .. 1005 II.
„ (Eleusine) .. 2693 IV.
„ (Erythrina) .. 781 I.
„ (Flagellaria) .. 2542 IV.
„ (Fumaria) .. 138 I.
„ (Garcinia) .. 262 I.
„ (Kochia) .. 2080 III.
„ (Lagerstroemia) 1081 II.
„ (Lantana) .. 1913 III.
„ (Leea) .. 618 I.
„ (Macaranga) .. 2271 III.
„ (Maesa) .. 1482 II.
„ (Mangifera) .. 652 I.
„ (Melilotus) .. 703 I.
(Morus) .. 2306 III.
„ (Pavetta) .. 1291 II.
„ (Pluchea) .. 1344 II.
„ (Pouzolzia) .. 2300 III.
„ (Quisqualis) .. 1037 II.
„ ((Rosa) .. 983 II.
„ (Samadera) .. 508 I.
„ (Saraca) .. 883 II.
„ (Scilla) .. 2520 IV.
„ (Stachytarpheta) 1923 III.
„ (Tamarindus) .. 887 II.
„ (Urginea) .. 2518 IV.
„ (Vateria) .. 292 I.
„ (Vitis) .. 609 I.
„ (Xyris) .. 2531 IV.
„ (Zanonia) .. 1168 II.
„ *var.* (Physalis minima) .. 1768 III.
indicum (Abutilon) .. 314 I.
„ (Arthrocnemum) 2081 III.
„ (Chrysanthemum) 1380 II.
„ (Heliotropium) 1689 III.
„ (Nasturtium) .. 147 I.
„ (Oroxylon) .. 1839 III.
„ (Sandoricum) 549 I.
„ (Sapium) .. 2282 III.
„ (Sesamum) .. 1858 III.
„ (Seseli) .. 1209 II.
„ (Solanum) .. 1755 III.
„ (Trichodesma) 1692 III.
indicus (Cajanus) .. 809 I.
„ (Hemidesmus) 1596 III.
„ (Pterocarpus) 827 I.
„ (Sphaeranthus) 1347 II.
Indigofera .. .. 707—17 I.
inerme (Clerodendron) 1945 III.
inermis (Lawsonia) .. 1077 II.
iners (Cinnamomum) .. 2148 III.
infortunatum (Clerodendron) .. 1950 III.
inophyllum (Calophyllum) 270 I.
insigne (Sapium) .. 2283 III.
insignis (Rhus) .. 648 I.
insititia (Prunus) .. 961 II.
integerrima (Pistacia) .. 650 I.
integrifolia (Artocarpus) 2336 III
„ (Brassica) .. 166 I.
„ (Holoptelea) 2293 III.

Page. Volume.
integrifolia (Premna) .. 1927 III.
intermedia (Ephedra) .. 2374 III.
" (Orthonnopsis) 1412 II.
intermedium (Sarcostemma) .. 1623 III.
intybus (Cichorium) .. 1433 II.
Inula .. .. 1351—53 II.
inundatus (Juncellus) .. 2636 IV.
involucrata (Tragia) .. 2280 III.
Ionidium .. .. 212—13 I.
Ipomoea .. .. 1714—29 III.
IRIDACEAE .. 2458—2464 IV.
iria (Cyperus) .. 2643 IV.
irio (Sisymbrium) .. 153 I.
iris .. .. 2459—62 IV.
isora (Helicteres) .. 371 I.
italica (Setaria) .. 2718 IV.
Ixora .. .. 1286—90 II.

jacquemontianus (Senecio) .. 1410 II.
jacquemontii (Farsetia) 150 I.
jaeschkeana (Ferula) .. 1218 II.
jalapa (Mirabilis) .. 2050 III.
jambolana (Eugenia) .. 1052 II.
jambos (Eugenia) .. 1049 II.
japonica (Eriobotrya) .. 989 II.
japonicum (Hypericum) 257 I.
" (Lygodium) 2749 IV.
Jasminum .. .. 1514—26 II.
jatamansi (Nardostachys) .. 1307 II.
Jatropha .. .. 2240—47 III.
Jatrorrhiza .. .. 98—100 I.
javanica (Bischofia) .. 2249 III.
" (Cassia) .. 877 II.
" (Hydrocotyle) 1195 II.
" (Picrasma) .. 510 I.
" (Sambucus) .. 1242 II.
javanicum (Cinnamomum) .. 2155—56 III.
javanicum (Pterocymbium) .. 368 I.
javanicum (Rhododendron) .. 1464 II.
javanicus (Euonymus) .. 573 I.
jayabo (Caesalpinia) .. 845 II.
jucundum (Bupleurum) 1198 II.
JUGLANDACEAE .. 2347—2349 III.
Juglans .. .. 2347—49 III.
jujuba (Zizyphus) .. 589 I.
julibrissin (Albizzia) .. 940 II.
JUNCACEAE .. 2543—2544 IV.
juncea (Crotalaria) .. 695 I.
Juncellus .. .. 2636 IV.
junciformis (Fimbristylis) .. 2635 IV.
Juniperus .. .. 2379—83 III.
Jurinea .. .. 1423—24 II.

Page. Volume.
Jussieua .. .. 1088—90 II.
Justicia .. .. 1896—98 III.
jwarancusa (Cymbopogon) .. 2676 IV.

K

Kaempferia .. .. 2426—28 IV.
Kalanchoe .. .. 998—1002 II.
kali (Salsola) .. .. 2085 III.
kamstchadalis (Parmelia) 2760 IV.
Kandelia .. .. 1012—13 II.
kauki (Mimusops) .. 1498 II.
Kedostris .. .. 1164—65 II.
kleiniana (Potentilla) .. 976 II.
kleinii (Sarcostigma) .. 570 I.
Kochia .. .. 2079—81 III.
koenigii (Murraya) .. 472 I.
Kokoona .. .. 573—74 I.
kumaonensis (Iris) .. 2461 IV.
kurroo (Gentiana) .. 1661 III.
kurrooa (Picrorrhiza) .. 1825 III.
kurzii (Taraktogenos) .. 227 I.
Kydia .. .. 349—50 I.
Kyllinga .. .. 2632—35 IV.
kysoor (Scirpus) .. 2646 IV.

L

labialis (Teramnus) .. 774 I.
LABIATAE .. 1955—2033 III.
lablab (Dolichos) .. 806 I.
lacera (Blumea) .. 1341 II.
lachryma-jobi (Coix) .. 2655 IV.
laciniata (Kalanchoe) .. 1001 II.
laciniatum (Aconitum) 45 I.
laciniosa (Bryonopsis) .. 1159 II.
lacor (Ficus) .. .. 2319 III.
Lactuca .. .. 1438—41 II.
Lagenandra .. .. 2602 IV.
Lagenaria .. .. 1116—19 II.
Lagerstroemia .. 1080—82 II.
lagocephala (Plantago) 2043 III.
lagopoides (Uraria) .. 750 I.
lakoocha (Artocarpus) .. 2338 III.
Lallemantia .. 2005—06 III.
lamarckii (Alangium) .. 1238 II.
lamellosa (Quercus) .. 2358 III.
lampas (Hibiscus) .. 336 I.
Lamprachaenium .. 1321 II.
lanata (Aerva) .. 2064 III.
" (Callicarpa) .. 1921 III.
" (Salvia) .. 1998 III.
lanceaefolia (Smilax) .. 2495 IV.
lanceolaria (Dalbergia) 820 I.
lanceolata (Plantago) .. 2037 III.
" (Pleopeltis) 2748 IV.
" (Pluchea) .. 1345 II.
Lannea .. .. 664—66 I.
Lantana .. .. 1913—15 III.

	Page.	Volume.
lanzan (Buchanania)	659	I.
lapidescens (Mylitta)	2758	IV.
Laportea	2343—44	III.
lappa (Saussurea)	1420	II.
lappaceum (Nephelium)	639	I.
Lasia	2623—24	IV.
lasiocarpa (Matricaria)	1384	II.
lasiocarpum (Desmodium)	761	I.
Lasiosiphon	2169—70	III.
Lathyrus	769—72	I.
latifolia (Anogeissus)	1034	II.
,, (Bassia)	1488	II.
,, (Dalbergia)	824	I.
,, (Elaeagnus)	2175	III.
,, (Orchis)	2413	IV.
,, (Premna)	1929	III.
,, (Vitis)	606	I.
latifolium (Crinum)	2470—74	IV.
,, (Lepidium)	175	I.
latilobum *var.* (Aconitum falconeri)	43	I.
Launaea	1445—49	II.
LAURACEAE	2143—2164	III.
laureola (Skimmia)	469	I.
laurifolia (Acronychia)	471	I.
,, (Sageraea)	71	I.
laurifolius (Cocculus)	89	I.
Lavandula	1972—74	III.
lawii (Exacum)	1654	III.
,, (Swertia)	1667	III.
Lawsonia	1076—80	II.
laxmanni (Typha)	2596	IV.
lebbeck (Albizzia)	936	II.
ledgeriana *var.* (Cinchona calisaya)	1261	II.
Leea	616—21	I.
Lens	741—42	I.
LENTIBULARIACEAE	1836—1837	III.
Leonotis	2023—25	III.
Leonurus	2013—14	III.
Lepidagathis	1893—96	III.
Lepidium	173—76	I
lepidotum (Rhododendron)	1462	II.
Leptadenia	1628—30	III.
leptostachya (Gouania)	601	I.
leschenaultii (Arisaema)	2604	IV.
,, (Valeriana)	1313	II.
lethale (Aconitum)	51	I.
Lettsomia	1708—09	III.
leucadendron (Melaleuca)	1042	II.
Leucaena	913—14	II.
Leucas	2016—23	III.
leucophloea (Acacia)	924	II.
leucopyrus (Flueggea)	2232	III.
leucoxylon (Vitex)	1944	III.
Lichenes	2760—61	IV.
ligulata (Bergenia)	993	II.
LILIACEAE	2490—2528	IV.
Lilium	2521—22	IV.

	Page.	Volume.
limbata (Otostegia)	2015	III.
limetta *var.* (Citrus medica)	490	I.
Limnanthemum	1668—69	III.
Limnophila	1812—15	III.
Limonia	478—79	I.
limonum *var.* (Citrus medica)	488	I.
LINACEAE	407—413	I.
Linaria	1808—09	III.
Lindenbergia	1810—11	III.
Lindera	2162—63	III.
lindleyana (Aporosa)	2251	III.
lineata (Berchemia)	587	I.
lingua (Ranunculus)	14	I.
linifolia (Indigofera)	708	I.
,, (Leucas)	2020	III.
linneanum (Ecbolium)	1905	III.
Linum	407—11	I.
Lippia	1915—17	III.
Litchi	636—37	I.
Lithospermum	1700—02	III.
Litsea	2157—62	III.
littorale (Enicostemma)	1655	III.
lobata (Urena)	320	I.
Lobelia	1452—54	II.
Lochnera	1559—61	II.
Lodoicea	2575—77	IV.
loeselii (Sisymbrium)	155	I.
LOGANIACEAE	1641—1650	III.
longa (Curcuma)	2423	IV.
longana (Nephelium)	638	I.
longiflora (Barleria)	1882	III.
,, (Randia)	1276	II.
longifolia (Asteracantha)	1864	III.
,, (Bassia)	1490	II.
,, (Euphorbia)	2209	III.
,, (Eurycoma)	512	I.
,, (Holigarna)	672	I.
,, (Pinus)	2387	III.
,, (Polyalthia)	72	I.
longifolius (Alysicarpus)	752	I.
,, (Ochrocarpos)	269	I.
longispina (Paramignya)	481	I.
longum (Piper)	2128	III.
longus (Cyperus)	2642	IV.
Lonicera	1243—44	II.
LORANTHACEAE	2178—2185	III.
Loranthus	2179—81	III.
lotus (Diospyros)	1506	II.
Loxococcus	2550—51	IV.
lucida (Gardenia)	1278	II.
,, *var.* (Samadera indica)	509	I.
lucidum (Geranium)	433	I.
ludwigii (Althaea)	298	I.
Luffa	1119—26	II.
lunaria (Botrychium)	2752	IV.
lunata (Drosera)	1004	II.
lunatus (Phaseolus)	798	I.
lunulatum (Adiantum)	2725	IV.

	Page.	Volume.
lunur-ankenda (Evodia)	451	I.
lupulus (Humulus) ..	2301	III.
lurida (Scopolia) ..	1792	III.
luridum (Aconitum) ..	29	I.
lutea (Striga) ..	1829	III.
luteo-album (Gnaphalium) ..	1350	II.
luteum (Colchicum) ..	2524	IV.
Luvunga	479—80	I.
Luzula	2543—44	IV.
Lycium	1779—81	III.
lycium (Berberis) ..	104	I.
Lycopus	1983—84	III.
Lygodium	2748—49	IV.
LYTHRACEAE ..	1071—1083	II.

M

Macaranga	2270—72	III.
Machilus	2155—56	III.
macleodii (Cordia) ..	1680	III.
macrantha (Machilus) ..	2155	III.
macrocarpum (Cinnamomum) ..	2151	III.
macrocarpus (Cocculus) ..	89	I.
macrocephala (Jurinea)	1424	II.
macrophylla (Callicarpa)	1922	III.
" (Leea) ..	617	I.
macropoda (Juniperus)	2382	III.
macrorrhiza (Alocasia ..	2617	IV.
macrostachya (Bauhinia)	901	II.
Macrotomia	1696—97	III.
maderaspatana (Grangea) ..	1336	II.
maderaspatana (Melothria) ..	1160	II.
maderaspatensis (Phyllanthus) ..	2222	III.
maderaspatana (Ventilago) ..	585	I.
Maerua	189—90	I.
Maesa	1481—83	II.
MAGNOLIACEAE ..	54—60	I.
mahaleb (Prunus) ..	963	II.
Mahonia	106	I.
major (Plantago) ..	2035	III.
majorana (Origanum) ..	1985	III.
malabarica (Ailanthus)	506	I.
" (Anisomeles)	2011	III.
" (Bassia) ..	1492	II.
" (Bauhinia)	900	II.
" (Myristica)	2140	III.
" (Tinospora)	76	I.
malabaricum (Dysoxylum) ..	548	I.
malabathricum (Melastoma) ..	1068	II.
malaccensis (Alpinia) ..	2448	IV.
Malachra	318—19	I.
Mallotus	2266—70	III.

	Page.	Volume.
MALPIGHIACEAE ..	416—418	I.
malus (Pyrus) ..	987	II.
Malva	299—304	I.
MALVACEAE ..	293—350	I.
Malvastrum	304—05	I.
mancinella (Hippomane)	2290	III.
Mangifera	651—56	I.
mangostana (Garcinia)	261	I.
Manihot	2289—90	III.
manihot (Hibiscus) ..	339	I.
Manisuris	2669—70	IV.
Maranta	2449	IV.
margaritiferum (Plesmonium) ..	2612	IV.
marianum (Silybum) ..	1417	II.
maritima (Artemisia) ..	1393	II.
maritimus (Rumex) ..	2112	III.
" (Scirpus). ..	2646	IV.
" (Sonchus) ..	1444	II.
marmelos (Aegle) ..	499	I.
Marrubium	2007—09	III.
Marsdenia	1627—28	III.
marsupium (Pterocarpus)	828	I
Martynia	1854—55	III.
Matricaria	1382—84	II.
Matthiola	142—43	I.
maxima (Citrus) ..	495	I.
" (Cucurbita) ..	1155	II.
" (Phragmites) ..	2695	IV.
mays (Zea)	2659	IV.
Meconopsis	131—33	I.
medica (Citrus) ..	485	I.
medicaginea (Crotalaria)	696	I.
Melaleuca	1042—43	II.
Melanorrhoea ..	662—64	I.
melanoxylon (Diospyros)	1504	II.
Melastoma	1067—69	II.
MELASTOMACEAE ..	1063—1070	II.
Melia	542—47	I.
MELIACEAE ..	533—565	I.
Melilotus	702—05	I.
Melissa	1993	III.
melo (Cucumis) ..	1140	II.
Melochia	378—79	I.
Melodinus	1545—46	II.
melongena (Solanum)	1757	III.
Melothria	1160	II.
Memecylon	1064—67	II.
MENISPERMACEAE	73—100	I.
Mentha	1978—83	III.
Menyanthes	1669—71	III.
Meriandra	1995—96	III.
Merremia	1732—34	III.
Mesua	274—76	I.
metal (Datura) ..	1791	III.
mexicana (Argemone) ..	129	I.
Michelia	55—59	I.
micranthus (Hibiscus) ..	327	I.
microcephalum (Lamprachaenium)	1321	II
microcos (Grewia) ..	394	I
Micromeria	1991—92	III.

Page. Volume.
microphylla (Cotoneaster) 992 II.
(Ehretia) .. 1682 III.
" (Euphorbia) 2200 III.
" (Pentatropis) 1614 III.
miliaceum (Panicum) .. 2710 IV.
miliare (Panicum) .. 2712 IV.
millefolium (Achillea) 1376 II.
Millettia .. .. 729—31 I.
Mimosa .. .. 915—19 II.
MIMOSACEAE .. 902—947 II.
mimosiodes (Cassia) .. 874 I.
" (Cynometra) 880 II.
Mimusops .. .. 1493—98 II.
minima (Physalis) .. 1766 III.
" (Rhynchosia) .. 808 I.
minimum (Capsicum) .. 1773 III.
Mirabilis .. .. 2050—51 III.
missionis
(Sarcocephalus) .. 1249 II.
mitis (Caryota) .. 2559 IV.
" (Holarrhena) .. 1573 II.
modesta (Acacia) .. 930 II.
moldavicum
(Dracocephalum) 2005 III.
molle (Geranium) .. 433 I.
" (Polygonum) .. 2102 III.
mollis (Sophora) .. 837 I.
Mollugo .. .. 1183—87 II.
moluccana (Aleurites) .. 2248 III.
moluccanus (Rubus) .. 967 II.
moluccensis (Carapa) .. 557 I.
Momordica .. .. 1129—38 II.
momordica *var.* (Cucumis
melo) .. .. 1142 II.
monacantha (Opuntia) 1175 II.
Moniera .. .. 1815—17 III.
monocarpus (Connarus) 685 I.
monocephala (Kyllinga) 2634 IV.
Monochoria .. .. 2529—30 IV.
monogynum
(Erythroxylon) .. 415 I.
monogynus (Melodinus) 1545 II.
monoica (Suaeda) .. 2084 III.
monoicum (Viscum) .. 2183 III.
monophylla (Atalantia) 482 I.
" (Cleome) .. 182 I.
" (Paramignya) 481 I.
monosperma (Butea) .. 785 I.
" (Mucuna) 776 I.
montana (Alocasia) .. 2618 IV.
" (Bridelia) .. 2214 III.
" (Diospyros) .. 1500 II.
" (Michelia) .. 59 I.
montanum
(Baliospermum) .. 2278 III.
montanum (Nasturtium) 147 I.
moorcroftiana (Salvia) 1998 III.
morella (Garcinia) .. 264 I.
Morinda .. .. 1293—97 II.
morindaefolia
(Pisonia) .. 2049 III.
Moringa .. .. 677—83 I.
MORINGACEAE .. 676—683 I.
Morus .. .. 2306—09 III.
mucronata
(Rhizophora) .. 1010 II.
Mucuna .. .. 775—80 I.
mukorossi (Sapindus) .. 635 I.
mukul (Comiphora) .. 526 I.
multicaule (Sedum) .. 1003 II.
multiceps (Astragalus) .. 739 I.
multifida (Jatropha) .. 2243 III.
multiflora (Dalbergia) .. 819 I.
" (Rosa) .. 984 II.
" (Zataria) .. 2027 III.
multiflorum
(Polygonatum) .. 2506 IV.
Mundulea .. .. 722—23 I.
mungo (Phaseolus) .. 797 I.
mungos (Ophiorrhiza) .. 1268 II.
munja (Saccharum) .. 2666 IV.
murex (Pedalium) .. 1856 III.
muricata (Annona) .. 69 I.
muricatum (Calonycton) 1711 III.
muricatus (Ranunculus) 17 I.
Murraya .. .. 472—75 I.
Musa .. .. 2452—56 IV.
Mussaenda .. .. 1269—71 II.
mutabilis (Hibiscus) .. 339 I.
muticus (Hyoscyamus) 1796 III.
Mylitta .. .. 2758 IV.
Myrica .. .. 2350—51 III.
MYRICACEAE .. 2349—2351 III.
Myricaria .. .. 250—51 I.
myriocarpa (Terminalia) 1031 II.
Myristica .. .. 2139—42 III.
MYRISTICACEAE .. 2138—2141 III.
MYRSINACEAE .. 1475—1484 II.
Myrsine .. .. 1476—77 II.
MYRTACEAE .. 1038—1063 II.
Myrtus .. .. 1040—42 II.
mystax (Hugonia) .. 412 I.
Mytragyna .. .. 1255—57 II.

N

nagensis (Areca) .. 2549 IV.
nagi (Myrica) .. 2350 III.
nagpurense
(Peucedanum) .. 1222 II.
nana (Flemingia) .. 817 I.
" (Jatropha) .. 2242 III.
" (Olax) .. 568 I.
Nannorhops .. 2566—67 IV.
napalense (Geranium) 431 I.
nepalensis (Coriaria) .. 675 I.
napaulense (Pittosporum) 229 I.
napaulensis (Clematis) 4 I.
" (Mahonia) 106 I.
" (Meconopsis) 133 I.
napus (Brassica) .. 161 I.
Nardostachys .. 1307—09 II.
nardus (Cymbopogon) 2680 IV.

Page. Volume.
Naregamia .. .. 535—36 I.
narum (Uvaria) .. 62 I.
narthex (Ferula) ..1216 II.
Nasturtium .. .. 145—48 I.
nasuta (Rhinacanthus) 1903 III.
Nauclea .. .. 1255 II.
neelgeriana (Anaphalis) 1349 II.
neesiana (Lindera) .. 2162 III.
neglectum *var.*
(Gossypium arboreum) 347 I.
negundo (Vitex) .. 1937 III.
Nelumbo .. .. 116—20 I.
nepalensis (Colutea) .. 721 I.
" (Coriaria) .. 675 I.
" (Iris) .. 2460 IV.
" (Osbeckia) .. 1070 II.
" (Potentilla) 973 II.
" (Rumex) .. 2113 III.
Nepeta .. .. 2002—04 III.
nepetaefolia (Leonotis) 2023 III.
Nephelium .. .. 637—39 I.
Neptunia .. .. 904 II.
neriifolia (Euphorbia) 2202 III.
" (Thevetia) .. 1554 II.
Nerium .. .. 1584—86 II.
nervifolia (Trichosanthes) 1111 II.
Neuracanthus .. .. 1882—84 III.
Nicandra .. .. 1779 III.
Nicotiana .. .. 1798—1801 III.
nicotianaefolia (Lobelia) 1453 II.
Nigella .. .. 11—12 I.
niger (Hyoscyamus) .. 1794 III.
nigra (Brassica) .. 168 I.
" (Morus) .. 2309 III.
" (Populus) .. 2367 III.
nigricans (Ixora) .. 1290 II.
" ((Opuntia) .. 1176 II.
nigrum (Piper) .. 2133 III.
" (Ribes) .. 996 II.
nigrum (Solanum) .. 1748 III.
nilagirica (Michelia) .. 58 I.
Nipa .. .. 2590—91 IV.
nipalensis (Rhamnus) .. 600 I.
niruri (Phyllanthus) .. 2225 III.
nivea (Boehmeria) .. 2344 III.
nivulia (Euphorbia) .. 2203 III.
nobile (Rheum) .. 2110 III.
noctiflora (Barleria) .. 1879 III.
nodiflora (Lippia) .. 1916 III.
noeanum (Cichorium) .. 1435 II.
Nothopanax .. .. 1234 II.
Notonia .. .. 1406—08 II.
nucifera (Cocos) .. 2581 IV.
" (Nelumbo) .. 116 I.
nuda (Eulophia) .. 2405 IV.
nudicaule (Papaver) .. 128 I.
nudicaulis (Launaea) .. 1446 II.
" (Mollugo) .. 1186 II.
nudiflora (Commelina) 2535 IV.
" (Trewia) .. 2265 III.
nuga (Caesalpinia) .. 846 II.
nummularia (Cotoneaster) 991 II.

Page. Volume.
nummularia (Zizyphus) 592 I.
nurvala (Crataeva) .. 191 I.
nutans (Carduus) .. 1416 II.
nux-vomica (Strychnos) 1645 III.
NYCTAGINACEAE .. 2044—2051 III.
Nyctanthes .. .. 1526—28 II.
Nymphaea .. .. 110—15 I.
NYMPHAEACEAE .. 108—120 I.
nymphaeoides
(Limnanthemum) .. 1669 III.

O

obliqua (Commelina) .. 2534 IV.
" (Cordia) .. 1675 III.
oblonga (Salacia) .. 582 I.
oblongifolia (Indigofera) 711 I.
oblongifolius (Croton) .. 2254 III.
oblongus (Elaeocarpus) 404 I.
obovata (Carapa) .. 558 I.
" (Cassia) .. 869 II.
obscura (Ipomoea) .. 1722 III.
obtusa (Gordonia) .. 281 II.
obtusifolia (Arenga) .. 2554 III.
" (Cassia) .. 865 II.
obtusifolium
(Cinnamomum) .. 2147 III.
obtusiloba (Anemone) .. 8 I.
obvallata (Saussurea) .. 1419 II.
occidentale (Anacardium) 657 I.
occidentalis (Cassia) .. 860 II.
occulta (Trigonella) .. 699 I.
ocellatum (Geranium) .. 433 I.
Ochna .. .. 517—18 I.
OCHNACEAE .. 515—518 I.
Ochradenus .. .. 204 I.
Ochrocarpos .. .. 268—70 I.
Ocimum .. .. 1959—68 III.
odollam (Cerbera) .. 1552 II.
odorata (Amphilophis) 2674 IV.
" (Bergia) .. 252 I.
" (Gynocardia) 223 I.
" (Hopea) .. 291 I.
" (Pavonia) .. 323 I.
" (Reseda) .. 202 I.
" (Viola) .. 207 I.
odoratissima (Aglaia) .. 550 I.
" (Albizzia) 939 II.
odoratissimus
(Artabotrys) .. 63 I.
odoratum (Canangium) 65 I.
odorum (Nerium) .. 1584 II.
oenoplia (Zizyphus) .. 595 I.
officinale (Jasminum) .. 1521 II.
" (Lithospermum) 1701 III.
" (Taraxacum) 1436 II.
" (Zingiber) .. 2435 IV.
officinalis (Alliaria) .. 152 I.
" (Althaea) .. 296 I.
" (Asparagus) .. 2502 IV.
" (Avicennia) .. 1952 III.

	Page.	Volume.
officinalis (Calendula)	1413	II.
„ (Chloranthus)	2137—38	III.
„ (Cinchona)	1262	II.
„ (Hyssopus)	1990	III.
„ (Melilotus)	704	I.
„ (Polyporus)	2757	IV.
„ (Salvia)	2000	III.
„ (Scindapsus)	2621	IV.
„ (Valeriana)	1310	II.
„ (Verbena)	1917—19	III.
officinarum (Saccharum)	2662	IV.
OLACACEAE	565—659	I.
Olax	567—69	I.
Oldenlandia	1262—67	II.
Olea	1532—36	II.
OLEACEAE	1513—1536	II.
oleifera (Moringa)	677	I.
oleoides (Daphne)	2167	III.
„ (Salvadora)	1539	II.
oleracea (Brassica)	160	I.
„ (Neptunia)	904	II.
„ (Portulacca)	242	I.
„ (Spinacia)	2078	III.
„ *var.* (Amaranthus blitum)	2062	III.
„ *var.* (Spilanthes acmella)	1368	II.
oleraceus (Sonchus)	1442	II.
Oligomeris	203—04	I.
olitorius (Corchorus)	399	I.
oliveri (Terminalia)	1031	II.
olivieri (Pteropyrum)	2093	III.
ONAGRACEAE	1088—1093	II.
Onosma	1697—99	III.
oojeinensis (Ougenia)	755	I.
operculata (Eugenia)	1051	II.
Operculina	1729—32	III.
OPHIOGLOSSACEAE	2750—2753	IV.
Ophioglossum	2750—51	IV.
Ophiorrhiza	1267—69	II.
oppositifolia (Colebrookea)	1977	III.
oppositifolia (Dioscorea)	2484	IV.
oppositifolia (Mollugo)	1184	II.
Opuntia	1173—78	II.
orbicularis (Centipeda)	1388	II.
ORCHIDACEAE	2399—2415	IV.
orchioides (Curculigo)	2469	IV.
Orchis	2412—13	IV.
orellana (Bixa)	216	I.
orientale (Papavr)	127	I.
„ (Polygonum)	2103	III.
„ (Ribes)	996	II.
„ (Viscum)	2183	III.
orientalis (Platanus)	2345	III.
„ (Siegesbeckia)	1358	II.
„ (Trema)	2296—97	II.
„ (Zosimia)	1224	II.
„ *var.* (Avena sativa)	2687	IV.

	Page.	Volume.
Origanum	1984—87	III.
ormocarpum	747—48	I.
ornata (Rivea)	1706	III.
OROBANCHACEAE	1833—1836	III.
Orobanche	1835—36	III.
orobanchoides (Striga)	1830	III.
Oroxylum	1839—41	III.
Orthonnopsis	1411—12	II.
Orthosiphon	1969—70	III.
Oryza	2651—53	IV.
Osbeckia	1069—70	II.
Osmunda	2749	IV.
OSMUNDACEAE	2749—2750	IV.
ostreatus (Agaricus)	2756	IV.
Osyris	2188—89	III.
Otostegia	2015—16	III.
Ougenia	755—56	I.
Ouratea	515—16	I.
ovalifolia (Pieris)	1458	II.
ovata (Codonopsis)	1454	II.
„ (Lagenandra)	2602	IV.
„ (Pachygone)	90	I.
„ (Plantago)	2039	III.
ovatum (Dendrobium)	2403	IV.
OXALIDACEAE	435—444	I.
Oxalis	436—40	I.
oxyacantha (Carthamus)	1431	II.
oxyphyllum (Zanthoxylum)	462	I.
Oxyria	2110—11	III.
Oxystelma	1604—06	III.

P

pabularia (Prangos)	1213	II.
pachycarpa (Millettia)	731	I.
Pachygone	90—91	I.
pachyphylla (Quercus)	2359	III.
Paederia	1297—99	II.
Paeonia	25—26	I.
pallida (Terminalia)	1032	II.
„ (Vitis)	615	I.
Palmae	2544—91	IV.
palmata (Adenia)	1101	II.
palmata (Ficus)	2326	III.
„ (Jatrorrhiza)	98	I.
„ (Trichosanthes)	1107	II.
palmatum (Aconitum)	36	I.
palustre (Nasturtium)	146	I.
palustris (Caltha)	18	I.
PANDANACEAE	2591—2593	IV.
Pandanus	2591—93	IV.
pandurata (Gastrochilus)	2429	IV.
paniculata (Acalypha)	2264	III.
„ (Andrographis)	1884	III.
„ (Celastrus)	574	I.
„ (Diospyros)	1508	II.
„ (Erycibe)	1704	III.
„ (Grewia)	393	I.
„ (Murraya)	474	I.
„ (Swertia)	1664	III.
„ (Terminalia)	1029	II.

	Page.	Volume.
paniculatum (Anodendron)	1590	II.
paniculatus (Amaranthus)	2059	III.
Panicum	2709—14	IV.
Papaver	122—28	I.
PAPAVERACEAE	120—134	I.
papaya (Carica)	1097	II.
PAPILIONACEAE	686—838	I.
papillosum (Saccolabium)	2409	IV.
paramignya	480—82	I.
pareira (Cissampelos)	95	I.
Parmelia	2760	IV.
Parsonsia	1578—79	II.
parthenoxylon (Cinnamomum)	2152	III.
parviflora (Fumaria)	138	I.
„ (Ixora)	1287	II.
„ (Malva)	303	I.
„ (Melissa)	1993	III.
„ (Plectronia)	1284	II.
„ (Rhus)	645	I.
„ (Rungia)	1908	III.
„ (Stachys)	2013	III.
„ (Urtica)	2340	III.
parviflorus (Pogostemon)	1976	III.
parvifolia (Mytragyna)	1256	II.
Paspalum	2704—06	IV.
Passiflora	1102—04	II.
PASSIFLORACEAE	1100—1104	II.
patens (Breynia)	2235	III.
patrini (Viola)	210	I.
patulum (Hypericum)	254	I.
pauciflorum (Cinnamomum)	2154	III.
Pavetta	1290—92	II.
Pavonia	323—25	I.
pavonina (Adenanthera)	908	II.
pectinata (Pedicularis)	1832	III.
PEDALIACEAE	1854—1861	III.
Pedalium	1856—57	III.
pedata (Vitis)	613	I.
pedatum (Adiantum)	2739	IV.
Pedicularis	1831—33	III.
peduncularis (Vitex)	1941	III.
pedunculata (Vandellia)	1821	III.
pedunculatum (Exacum)	1654	III.
Peganum	456—58	I.
peltata (Hernandia)	2165	III.
„ (Macaranga)	2270	III.
pendulus (Cocculus)	88	I.
pennata (Acacia)	933	II.
Pennisetum	2706—08	IV.
pensylvanicus (Ranunculus)	16	I.
pentandra (Ceiba)	358	I.
„ (Trianthema)	1181	II.
Pentapetes	376—77	I.
pentaphylla (Clausena)	477	I.
„ (Dioscorea)	2481	IV.
„ (Mollugo)	1185	II
Pentatropis	1613—15	III.
pepo (Cucurbita)	1156	II.

	Page.	Volume.
peregrina (Diospyros)	1502	II.
peregrinum (Cyrtophyllum)	1650	III.
perenne (Linum)	410	I.
perennis (Macrotomia)	1697	III.
perfoliatum (Lepidium)	176	I.
perforata (Parmelia)	2760	IV.
perforatum (Hypericum)	255	I.
Pergularia	1615—17	III.
Pericampylus	91—92	I.
Periploca	1601—02	III.
Peristrophe	1910—11	III.
perlata (Parmelia)	2760	IV.
Perowskia	1994—95	III.
perpusilla (Melothria)	1161	II.
persica (Artemisia)	1398	II.
„ (Prunus)	954	II.
„ (Salvadora)	1537	II.
„ *var.* (Fumaria parviflora)	138	I.
persicaria (Polygonum)	2099	III.
pertusa (Rhaphidophora)	2622	IV.
peruviana (Physalis)	1769	III.
pes-caprae (Ipomoea)	1726	III.
pes-tigridis (Ipomoea)	1720	III.
petiolaris (Berberis)	102	I.
petrosa (Tephrosia)	726	I.
Peucedanum	1218—23	II.
Phanerogamia	1	I.
pharmacoides (Giesekia)	1187	II.
Phaseolus	793—800	I.
philippinensis (Mallotus)	2267	III.
Phlogacanthus	1889—90	III.
phlomidis (Clerodendron)	1947	III.
phoenicea (Pentapetes)	376	I.
Phoenix	2560—66	IV.
Phragmits	2695—96	IV.
Phyllanthus	2217—27	III.
Physalis	1766—69	III.
physaloides (Nicandra)	1779	III.
Physoclaina	1793—94	III.
Phytolacca	2090—91	III.
PHYTOLACCACEAE	2089—2091	III.
Picrasma	509—10	I.
picris (Centaurea)	1428	II.
Picrorrhiza	1824—26	III.
picta (Uraria)	749	I.
pictum (Acer)	640	I.
„ (Graptophyllum)	1906	III.
Pieris	1458—59	II.
pilosa (Bidens)	1373	II.
pilosus (Dipterocarpus)	287	I.
pilulifera (Urtica)	2342	III.
Pimenta	1055—56	II.
Pimpinella	1206—09	II.
Pinanga	2551—52	IV.
pinnata (Garuga)	524	I.
„ (Hardwickia)	882	II.
„ (Kalanchoe)	999	II.
„ (Quamoclit)	1712	III.
„ (Spondias)	673	I.
pinnatifida (Glossogyne)	1374	II.

Page. Volume.
pinnatifida (Launaea) 1447 II.
" (Pluchea) .. 1345 II.
" (Tacca) .. 2476 IV.
Pinus .. .. 2385—90 III.
Piper .. .. 2126—36 III.
PIPERACEAE .. 2125—2136 III.
piperita (Mentha) .. 1980 III.
piscidia (Walsura) .. 555 I.
Pisonia .. .. 2048—50 III.
Pistacia .. .. 649—51 I.
Pistia .. .. 2600—02 IV.
Pisum .. .. 772—73 I.
Pithecellobium .. 945—47 II.
PITTOSPORACEAE .. 228—230 I.
Pittosporum .. .. 228—30 I.
PLANTAGINACEAE .. 2033—2044 III.
Plantago .. .. 2034—44 III.
PLATANACEAE .. 2345—2347 III.
Platanus .. .. 2345—47 III.
plebeia (Salvia) .. 1998 III.
plēbejum (Polygonum) 2097 III.
plectranthoides
(Pogostemon) .. 1974 III.
Plectronia .. .. 1282—85 II.
Pleopeltis .. .. 2748 IV.
Plesmonium .. .. 2612 IV.
plicata (Setaria) .. 2719 IV.
Pluchea .. .. 1344—46 II.
PLUMBAGINACEAE .. 1465—1471 II.
Plumbzago .. .. 1465—70 II.
Plumieria .. .. 1561—64 II.
Podophyllum .. .. 106—08 I.
Pogostemon .. .. 1974—77 III.
Polianthes .. .. 2474—75 IV.
Polyalthia .. .. 72—73 I.
polyantha (Litsea) .. 2160 III.
Polycarpea .. .. 239—40 I.
polycarpum (Desmodium) 760 I.
polycerata (Trigonella) 701 I.
Polygala .. .. 231—35 I.
POLYGALACEAE .. 230—235 I.
POLYGONACEAE .. 2091—2117 III.
Polygonatum .. .. 2506—07 IV.
polygonoides
(Calligonum) .. 2092 III.
Polygonum .. .. 2094—2105 III.
polymorphum (Aspidium) 2746 IV.
POLYPODIACEAE .. 2733—2749 IV.
Polyporus .. .. 2757 IV.
polystachya
(Aphanamixis) .. 551 I.
Polytoca .. .. 2656—58 IV.
Pongamia .. .. 830—32 I.
PONTEDERIACEAE .. 2528—2530 IV.
populnea (Thespesia) .. 340 I.
Populus .. .. 2366—70 III.
Portulaca .. .. 241—46 I.
PORTULACACEAE .. 240—246 I.
portulacastrum
(Trianthema) .. 1180 II.
potatorum (Strychnos) .. 1647 III.
Potentilla .. .. 972—77 II.
Page. Volume.
Pothos .. .. 2624—26 IV.
Pouzolzia .. .. 2299—2300 III.
praealta (Physoclaina) 1793 III.
prainii (Amorphophallus) 2610 IV.
Prangos .. .. 1213—14 II.
pratense (Geranium) .. 434 I.
pratensis (Cardamine) 148 I.
" (Lathyrus) .. 771 I.
precatorius (Abrus) .. 764 I.
Premna .. .. 1926—31 III.
Primula .. .. 1472—73 II.
PRIMULACEAE .. 1472—1475 II.
Prinsepia .. .. 965—66 II.
prionitis (Barleria) .. 1877 III.
procera (Albizzia) .. 942 II.
" (Calotropis) .. 1609 III.
" (Thysanolaema) 2708 IV.
procumbens (Coldenia) 1683 III.
" (Hypecoum) 134 I.
" (Justicia) 1896 III.
prolifera (Smilax) .. 2497 IV.
proper *var.* (Citrus
aurantium) .. 491 I.
proper *var.* (Citrus
medica) .. 486 I.
prophetarum (Cusumis) 1144 II.
Prosopis .. .. 910—12 II.
prostrata (Chrozophora) 2259 III.
" (Crotalaria) 693 I.
" (Ruellia) .. 1866 III.
prostratum
(Gtniosporum) .. 1968 III.
Prunus .. .. 951—56 II.
prurita (Mucuna) .. 778 I.
Psammogeton .. .. 1231 II.
Pseudarthria .. .. 748—49 I.
pseudogingseng (Aralia) 1233 II.
Psidium .. .. 1045—48 II.
Psoralea .. .. 717—21 I.
psyllium (Plantago) .. 2042 III.
Pteris .. .. 2741—42 IV.
Pterocarpus .. .. 825—29 I.
Pterocymbium .. 368 I.
Pteropyrum .. .. 2093—94 III.
Pterospermum .. 372—76 I.
Pterygota .. .. 362—63 I.
pubescens (Jasminum) 1517 II.
" (Nymphaea) 113 I.
" (Vitex) .. 1943 III.
pudica (Mimosa) .. 915- II.
Pueraria .. .. 791—93 I.
pulchella (Indigofera) 714 I.
" *var.* (Swertia
angustifolia) .. 1666 III.
pulchellum (Desmodium) 762 I.
pulcherrima (Cæsalpinia) 848 II.
Pulicaria .. .. 1353—55 II.
pulverulenta (Frankenia) 236 I.
pumila (Cassia) .. 875 II.
" (Ochna) .. 517 I.
punctatum (Polygonum) 2102 III.
Punica .. .. 1014—87 II.

	Page.	Volume.
PUNICACEAE	1083—1087	II.
purpurascens (Pogostemon)	1975	III.
purpurascens (Swertia)	1664	III.
purpurea (Bauhinia)	897	II.
,, (Tephrosia)	724	I.
purpureus (Rhamnus)	599	I.
pusilla (Lochnera)	1560	II.
,, (Phœnix)	2565	IV.
pusillum (Geranium)	434	I.
Putranjiva	2236—38	III.
Pycnocycla	1210	II.
pyrifolia (Terminalia)	1030	II.
Pyrus	986—89	II.
pyxidaria (Vandellia)	1821	III.

Q

	Page.	Volume.
quadrangularis (Sauropus)	2233	III.
quadrangularis (Vitis)	604	I.
quadrifida (Portulaca)	244	I.
Quamoclit	1712—14	III.
quassioides (Picrasma)	509	I.
quercifolia (Drynaria)	2747	IV.
Quercus	2356—59	III.
quinquelobus (Senecio)	1410	II.
quinquelocularis (Eriolaena)	377	I.
Quisqualis	1036—38	II.

R

	Page.	Volume.
racemosa (Barringtonia)	1057	II.
,, (Bauhinia)	894	II.
,, (Fagraea)	1642	III.
,, (Inula)	1351	II.
,, (Symplocos	1511	II.
racemosum (Cosmostigma)	1633	III.
racemosus (Asparagus)	2499	IV.
Radermachera	1849—51	III.
radiatus (Phaseolus)	795	I.
ramontchi (Flacourtia)	220	I.
ramosa (Corydalis)	136	I.
ramosissima (Linaria)	1808	III.
Randia	1271—77	I.
RANUNCULACEAE	1—52	I.
Ranunculus	13—17	I.
rapa *var.* (Brassica campestris)	165	I.
Raphanus	178—80	I.
Rauwolfia	1549—52	II.
rauwolfii (Bongardia)	108	I.
recurvá (Juniperus)	2382	III.
recurvum (Haloxylon)	2089	III.
reflexa (Cuscuta)	1741	III.
regalis (Osmunda)	2750	IV.
regia (Juglans)	2347	III.
Reinwardtia	411—12	I.

	Page.	Volume.
religiosa (Ficus)	2317	III.
Remusatia	2612—13	IV.
remotiflora (Lactuca)	1440	II.
reniformis (Ipomoea)	1721	III.
repanda (Urena)	322	I.
repens (Agropyron)	2698	IV.
,, (Rungia)	1907	III.
,, (Vitis)	615	I.
reptans (Bonnaya)	1822	III.
,, (Ipomoea)	1724	III.
,, (Potentilla)	975	II.
Reseda	202—03	I.
RESEDACEAE	202—204	I.
reticulata (Annona)	68	I.
,, (Gironniera)	2297	III.
,, (Leptadenia)	1629	III.
,, (Primula)	1473	II.
,, (Salacia)	582	I.
reticulatus (Croton)	2253	III.
,, (Hyoscyamus)	1797	III.
,, (Phyllanthus)	2219	III.
retroflexum (Desmodium)	762	I.
retusa (Bauhinia)	895	II.
,, (Bridelia)	2213	III.
,, (Crotalaria)	697	I.
,, (Ficus)	2315	III.
revoluta (Cycas)	2397	IV.
rex (Begonia)	1170	II.
RHAMNACEAE	582—602	I.
rhamnoides (Breynia)	2235	III.
,, (Hippophae)	2176	III.
Rhamnus	596—600	I.
Rhaphidophora	2622—2623	IV.
Rhazya	1557—58	II.
rheedii (Calamus)	2589	IV.
,, (Kandelia)	1012	II.
Rheum	2107—10	III.
Rhinacanthus	1903—04	III.
Rhizophora	1009—11	II.
RHIZOPHORACEAE	1009—1013	II.
Rhododendron	1459—64	II.
rhoeas (Papaver)	123	I.
rhombifolia (Sida)	310	I.
Rhus	644—49	I.
Rhynchosia	807—08	I.
Ribes	995—97	II.
ribes (Embelia)	1478	II.
,, (Ficus)	2325	III.
Ricinus	2273—77	III.
ridleyi (Wickstroemia)	2169	III.
riparia (Homonoia)	2272	III.
ritchieana (Nannorhops)	2566	IV.
ritchiei (Jasminum)	1525	II.
Rivea	1705—06	III.
robertianum (Geranium)	431	I.
robusta (Leea)	619	I.
,, (Shorea)	288	I.
Rosa	978—84	II.
ROSACEAE	947—992	II.
rosa-sinensis (Hibiscus)	335	I.
rosea (Althaea)	297	I.
,, (Lochnera)	1559	II.

Page. Volume.
rosea (Plumbago) .. 1469 II.
roseus (Daedalacanthus) 1868 III.
rostrata (Kedostris) .. 1165 II.
rotang (Calamus) .. 2587 IV.
rothii (Cordia) .. 1678 III.
rottleri (Chrozophora) 2258 III.
rottlerianum (Jasminum) 1526 II.
Rotula .. .. 1684—85 III.
rotunda (Kaempferia) .. 2428 IV.
rotundifolia (Malva) .. 302 I.
rotundifolium
(Geranium) .. 434 I.
rotundus (Cyperus) .. 2638 IV.
Rourea .. .. 683—85 I.
roxburghiana
(Dicliptera) .. 1910 III.
roxburghiana
(Sansevieria) .. 2457 IV.
roxburghianum (Carum) 1204 II.
roxburghii (Erythraea) 1657 III.
roxburghii
(Heterophragma) .. 1845 III.
„ (Limnophila) 1815 III.
„ (Putranjiva) 2237 III.
„ (Vernonia) 1324 II.
„ *var.* (Phaseolus
mungo) .. 797 I.
Roylea .. .. 2014—15 III.
royleana (Euphorbia) .. 2206 III.
„ (Gymnosporia) 579 I.
„ (Inula) .. 1353 II.
„ (Lallemantia) 2005 III.
roylei (Doronicum) .. 1404 II.
„ (Fritillaria) .. 2523 IV.
„ (Marsdenia) .. 1628 III.
rubescens
(Homalomena) .. 2620 IV.
Rubia .. .. 1303—06 II.
RUBIACEAE .. 1245—1306 II.
rubicaulis (Mimosa) .. 918 II.
rubiginosa (Sterculia) .. 367 I.
rubra (Basella) .. 2087 III.
„ (Nymphaea) .. 112 I.
„ (Plumieria) .. 1564 II.
Rubus .. .. 966—69 II.
ruderale (Lepidium) .. 176 I.
ruderalis (Nepeta) .. 2003 III.
Ruellia .. .. 1865—67 III.
rugata (Acacia) .. 931 II.
rugosa (Zizyphus) .. 594 I.
Rumex .. .. 2111—17 III.
rumphii (Cycas) .. 2396 IV.
„ (Ficus) .. 2316 III.
runcinata (Lactuca) .. 1439 II.
Rungia .. .. 1906—09 III.
rupicola (Loxococcus) 2551 IV.
rustica (Nicotiana) .. 1800 III.
Ruta .. .. 452—56 I.
RUTACEAE .. 448—502 I.
rutaecarpa (Evodia) .. 452 I.
ruta-muraria (Asplenium) 2743 IV.
ruthenicum (Lycium) .. 1781 III.

Page. Volume.
S
sabdariffa (Hibiscus) .. 329 I.
saccharifera (Arenga) .. 2553 IV.
Saccharum .. .. 2661—69 IV.
Saccolabium .. .. 2409—10 IV.
sacrorum (Artemisia) .. 1397 II.
Sageraea .. .. 71 I.
Sagittaria .. .. 2630—31 IV.
sagittifolia (Sagittaria) 2631 IV.
Salacia .. .. 581—83 I.
SALICACEAE .. 2360—2370 III.
salicifolia (Commelina) 2536 IV.
„ (Hippophae) 2177 III.
Salicornia .. .. 2082 III.
salicornicum (Haloxylon) 2088 III.
Salix .. .. 2361—66 III.
Salsola .. .. 2084—86 III.
Salvadora .. .. 1536—40 II.
SALVADORACEAE .. 1536—1542 II.
Salvia .. .. 1996—2001 III.
Samadara .. .. 507—09 I.
sambac (Jasminum) .. 1515 II.
Sambucina (Auricularia) 2758 IV.
Sambucus .. .. 1240—42 II.
sampsoni (Hypericum) 257 I.
SAMYDACEAE .. 1092—1096 II.
sanctum (Ocimum) .. 1965 III.
Sandoricum .. .. 549—50 I.
sanguinea (Euphorbia) 2210 III.
Sansevieria .. .. 2457—58 IV.
SANTALACEAE .. 2185—2189 III.
santalinus (Pterocarpus) 826 I.
santaloides (Rourea) .. 684 I.
Santalum .. .. 2186—88 III.
santolina (Achillea) .. 1378 II.
sapan (Caesalpinia) .. 847 II.
sapientum (Musa) .. 2452 IV.
SAPINDACEAE .. 621—643 I.
Sapindus .. .. 631—36 I.
Sapium .. .. 2281—84 III.
Saponaria .. .. 238—39 I.
sapota (Achras) .. 1486 II.
SAPOTACEAE .. 1485—1498 II.
Saraca .. .. 882—84 II.
Sarcocephalus .. 1249—50 II.
Sarcostemma .. 1621—24 III.
Sarcostigma .. .. 569—70 I.
sarmentosum (Piper) .. 2136 III.
sativa (Avena) .. 2687 IV.
„ (Cannabis) .. 2302 III.
„ (Eruca) .. 170 I.
„ (Nigella) .. 11 I.
„ (Oryza) .. 2651 IV.
„ (Zizyphus) .. 593 I.
sativum (Allium) .. 2513 IV.
„ (Coriandrum) .. 1225 II.
„ (Lepidium) .. 174 I.
„ (Pisum) .. 772 I.
sativus (Ananas) .. 2478 IV.
„ (Crocus) .. 2462 IV.
„ (Cucumis) .. 1144 II.

	Page.	Volume.
Sativus (Lathyrus)	770	I.
„ (Raphanus)	178	I.
Sauromatum	2605—07	IV.
Sauropus	2233—34	III.
Saussurea	1418—23	II.
saxatilis (Rubus)	968	II.
saxifraga (Pimpinella)	1207	II.
SAXIFRAGACEAE	992—997	II.
scaber (Elephantopus)	1328	II.
scariosa (Cylista)	812	I.
Scaevola	1449—51	II.
scandens (Derris)	833	I.
„ (Entada)	906	II.
„ (Floscopa)	2541	IV.
„ (Gnetum)	2375	III.
„ (Jasminum)	1524	II.
„ (Luvunga)	479	I.
„ (Olax)	567	I.
„ (Pothos)	2625	IV.
Scaphium	369—70	I.
scapiflorum (Aneilemma)	2538	IV.
scarabaeoides (Atylosia)	811	I.
scariola (Lactuca)	1440	II.
Scariosa (Cylista)	812	I.
scariosus (Cyperus)	2637	IV.
sceleratus (Ranunculus)	14	I.
schaénoprasum (Allium)	2515	IV.
Schima	277—78	I.
schizophylla (Cocos)	2585	IV.
Schleichera	629—31	I.
schoenanthus (Cymbopogon)	2677	IV.
scholaris (Alstonia)	1565	II.
Schrebera	1530—32	II.
schreberi (Brasenia)	109	I.
Schweinfurthia	1809—10	III.
Scilla	2519—21	IV.
Scindapsus	2620—22	IV.
Scirpus	2644	IV.
SCITAMINEAE	2415—2456	IV.
sclerophylla (Grewia)	389	I.
Scoparia	1823—24	III.
scoparia (Artemisia)	1393	II.
„ (Kochia)	2080	III.
Scopolia	1792—93	III.
scordium (Teucrium)	2031	III.
scrobiculatum (Paspalum)	2705	IV.
SCROPHULARIACEAE	1801—1833	III.
scutatus (Rumex)	2117	III.
Sebastiania	2287—88	III.
sebiferum (Sapium)	2284	III.
Secamone	1602—03	III.
sedoides (Kochia)	2080	III.
Sedum	1001—03	I.
Semecarpus	666—70	I.
semialata (Rhus)	646	I.
semitriloba (Triumfetta)	396	I.
sempervirens (Buxus)	2211	III.
„ (Cupressus)	2378	III.
Senecio	1408—11	II.
senegal (Acacia)	929	II.
sennoides (Ormocarpum)	747	I.
sensitiva (Smithia)	746	I.
sensitivum (Biophytum)	440	I.
sepiaria (Cæsalpinia)	849	II.
„ (Capparis)	199	I.
„ (Flacourtia)	222	I.
„ (Ipomoea)	1723	III.
sericea (Crotalaria)	698	I.
„ (Potentilla)	976	II.
serpens (Viola)	206	I.
serpentina (Rauwolfia)	1550	II.
serpyllum (Thymus)	1988	III.
serrata (Boswellia)	521	I.
serratum (Clerodendron)	1948	III.
serratus (Allophylus)	628	I.
„ (Elaeocarpus)	405	I.
serrulatum (Polygonum)	2104	III.
sesamoides (Artanema)	1818	III.
Sesamum	1857—61	III.
Sesbania	732—36	I.
Seseli	1209—10	II.
sessilifolia (Nauclea)	1255	II.
sessilifolius (Hymenocrater)	2030	III.
sessilis (Alternanthera)	2069	III.
Setaria	2717—20	IV.
setosa (Vitis)	610	I.
setosum (Rhododendron)	1462	II.
Sexifraga (Pimpinella)	1207	II.
seychellarum (Lodoicea)	2575	IV.
Shorea	288—90	I.
sibirica (Polygala)	234	I.
sibiricum (Geranium)	435	I.
sibiricus (Leonurus)	2014	III.
Sida	305—13	I.
Siegesbeckia	1358—59	II.
sievesiana (Artemisia)	1400	II.
siliqua (Ceratonia)	885	II.
Silybum	1417—18	II.
SIMAROUBACEAE	502—515	I.
simiarum (Polyalthia)	73	I.
simplex (Phyllanthus)	2224	III.
„ (Zygophyllum)	425	I.
sindica (Blepharis)	1873	III.
sinuata (Urena)	321	I.
siphonantha (Pedicularis)	1832	III.
siphonanthus (Clerodendron)	1951	III.
sissoo (Dalbergia)	818	I.
Sisymbrium	152—55	I.
Skimmia	468—69	I.
smilacifolia (Clematis)	5	I.
Smilax	2494—98	IV.
Smithia	745—47	I.
soja (Glycine)	773	I.
solanacea (Vallaris)	1580	II.
SOLANACEAE	1744—1801	III.
Solanum	1746—66	III.
Solidago	1334—35	II.
somnifera (Withania)	1774	III.
somniferum (Papaver)	126	I.
sonchifolia (Emilia)	1405	II.
Sonchus	1441—45	II.

	Page.	Volume.
Sonneratia	1082—83	II.
soongarica (Iris) ..	2461	IV.
sophera (Cassia) ..	863	II.
sophia (Descurainia) ..	156	I.
Sophora	835—38	I.
Sopubia	1830—31	III.
Sorghum	2720—24	IV.
Soymida	559—60	I.
spathacea (Dolichandrone)	1843	III.
spathulata (Kalanchoe)	1000	II.
spathulata (Vanda) ..	2407	IV.
speciosa (Alpinia) ..	2448	IV.
„ (Argyreia) ..	1707	III.
„ (Barringtonia)	1060	II.
speciosum (Arisaema)	2603	IV.
speciosus (Costus) ..	2440	IV.
spelta (Triticum) ..	2702	IV.
Sphaeranthus ..	1346—48	II.
sphaerocarpa (Schweinfurthia) ..	1809	III.
sphaerostachyum (Polygonum) ..	2104	III.
sphaerostachyus (Neuracanthus) ..	1883	III.
spicata (Actaea) ..	23	I.
„ (Eugenia) ..	1054	II.
„ (Wagatea) ..	853	II.
spicatum (Aconitum) ..	43	I.
„ (Hedychium)	2430	IV.
„ (Pennisetum)	2706	IV.
spiciforme (Rheum) ..	2108	III.
spicigera (Prosopis) ..	910	II.
Spilanthes	1365—68	II.
Spinacia	2078—79	III.
spinarum (Carissa) ..	1548	II.
Spinosa (Capparis) ..	195	I.
„ (Dalbergia) ..	822	I.
„ (Gymnosporia)	577	I.
„ (Salvia) ..	2000	III.
„ (Sida) ..	306	I.
„ (Vangueria) ..	1285	II.
spinosus (Amaranthus)	2057	III.
„ (Convolvulus)	1737	III.
spirale (Solanum) ..	1752	III.
spiralis (Cryptocoryne)	2599	IV.
„ (Parsonsia) ..	1579	II.
„ (Vallisneria) ..	2398	IV.
Spondias	672—75	I.
spontaneum (Saccharum)	2668	IV.
squamosa (Annona) ..	66	I.
squarrosa (Ochna) ..	518	I.
Stachys	2012—13	III.
Stachytarpheta ..	1923—24	III.
stamineus (Orthosiphon)	1969	III.
stans (Tecoma) ..	1852	III.
Statice	1471	II.
stellata (Nymphaea) ..	113	I.
stelligera (Leucas) ..	2022	III.
Stemodia	1811—12	III.
Stenoloma	2734	IV.
Stephania	92—94	I.
Sterculia	363—68	I.

	Page.	Volume.
STERCULIACEAE ..	360—384	I.
Stereospermum ..	1846—49	III.
stipulata (Albizzia) ..	943	II.
stocksiana (Commiphora)	529	I.
stocksianum (Teucrium)	2031	III.
stocksii (Litsea) ..	2161	III.
„ (Pimpinella) ..	1208	II.
„ (Sarcostemma)	1624	III.
stramonium (Datura) ..	1784	III.
strateumatica (Zeuxine)	2412	IV.
stratiotes (Pistia) ..	2600	IV.
Streblus	2304—06	III.
stricta (Opuntia) ..	1175	II.
„ (Rhazya) ..	1557	II.
strictum (Canarium) ..	531	I.
„ (Linum) ..	410	I.
strictus (Dendrocalamus) ..	2728	IV.
Striga	1829—30	III.
strigosa (Barleria) ..	1880	III.
strigosum (Heliotropium)	1688	III.
Strobilanthes ..	1869—71	III.
strobilifera (Flemingia)	813	I.
strobilifera (Meriandra)	1995	III.
strobiliferus (Astragalus)	739	I.
strumarum (Xanthium)	1356	II.
Strychnos	1643—50	III.
Suaeda	2082—84	III.
Suaveolens (Artabotrys)	64	I.
„ (Hamiltonia)	1300	II.
„ (Hyptis) ..	2032	III.
„ (Stereospermum)	1848	III.
suberifolium (Pterospermum) ..	373	I.
suberosa (Erythrina) ..	784	I.
„ (Mundulea) ..	722	I.
subulata (Oligomeris) ..	203	I.
subulatum (Amomum) ..	2432	IV.
succedanea (Rhus) ..	648	I.
succirubra (Cinchona)	1261	II.
suffruticosa (Commelina)	2534	IV.
„ (Jussieua)	1089	II.
„ (Ruellia)	1867	III.
suma (Acacia) ..	935	II.
sumatrana (Brucea) ..	511	I.
superba (Butea) ..	788	I.
„ (Gloriosa) ..	2525	IV.
supina (Potentilla) ..	973	II.
surattensis (Hibiscus)	338	I.
Swertia	1663—68	III.
swietenia (Chloroxylon)	564	I.
swietenoides (Schrebera)	1531	II.
sylvatica (Synantherias)	2611	IV.
sylvaticum (Piper) ..	2131	III.
sylvestre (Gymnema) ..	1625	III.
sylvestris (Malva) ..	300	I.
„ (Mentha) ..	1981	III.
„ (Phœnix) ..	2563	IV.
„ (Viola) ..	212	I.
SYMPLOCACEAE ..	1509—1513	II.
Syplocos	1509—13	II.
Synantherias	2611	IV.

Page. Volume.

T

tabacum (Nicotiana) .. 1798 III.
tabularis (Chukrasia) .. 560 I.
Tacca .. .. 2475—77 IV.
TACCACEAE .. 2475—2477 IV.
tagala (Aristolochia) .. 2124 III.
Tagetes .. .. 1385—86 II.
talboti (Ficus) .. 2332 III.
tamala (Cinnamomum) 2146 III.
TAMARICACEAE .. 246—251 I.
tamarindifolia
(Dalbergia) .. 823 I.
Tamarindus .. .. 887—90 II.
Tamarix .. .. 246—50 I.
Tanacetum .. .. 1389—90 II.
Taraktogenos .. .. 227—28 I.
Taraxacum .. .. 1436—38 II.
tataricum (Fagopyrum) 2106 III.
Taverniera .. .. 740 I.
Taxus .. .. 2383—85 III.
Tecoma .. .. 1851—52 III.
Tecomella .. .. 1841—42 III.
Tectona .. .. 1924—26 III.
tectorius (Pandanus) .. 2592 IV.
teeta (Coptis) .. 19 I.
telephioides (Polygala) 233 I.
tenax (Grewia) .. 392 I.
tenella (Gentiana) .. 1661 III.
tentaculatus (Haplanthus) 1888 III.
tenuifolia (Cheilanthes) 2741 IV.
tenuifolius (Asphodelus) 2507 IV.
„ (Senecio) .. 1409 II.
tenuior (Ziziphora) .. 2029 III.
tenuis (Tylophora) .. 1633 III.
Tephrosia .. .. 723—27 I.
Teramnus .. .. 774—75 I.
teres (Vernonia) .. 1324 II.
Terminalia .. .. 1014—33 II.
ternatea (Clitoria) .. 802 I.
ternatum (Botrychium) 2753 IV.
terrestris (Tribulus) .. 420 I.
TERNSTROEMIACEAE 276—281 I.
tessellata (Vanda) .. 2408 III.
tetracantha (Azima) .. 1541 II.
tetragonoloba (Cyamopsis) 706 I.
tetragonum (Exacum) .. 1653 III.
„ (Stereospermum) 1846 III.
tetrasperma (Salix) .. 2362 III.
Teucrium .. .. 2030—32 III.
textilis (Musa) .. 2456 IV.
thaliana (Arabidopsis) 158 I.
Thalictrum .. .. 9—10 I.
thapsus (Verbascum) .. 1804 III.
thea (Camellia) .. 279 I.
Theobroma .. .. 382—83 I.
theophrasti (Abutilon) 317 I.
Thespesia .. .. 340—43 I.
Thevetia .. .. 1553—56 II.
thomsoniana (Euphorbia) 2207 III.
THYMELACACEAE .. 2166—2172 III.
thymifolia (Euphorbia) 2199 III.

Page. Volume.

Thymus .. .. 1987—89 III.
thyrsiflorus
(Phlogacanthus) .. 1889 III.
Thysanolaena .. 2708—09 IV.
tiglium (Croton) .. 2256 III.
TILIACEAE .. 384—406 I.
tiliaceus (Hibiscus) .. 333 I.
Tiliacora .. .. 83—84 I.
tiliaefolia (Grewia) .. 386 I.
tiliaefolium (Desmodium) 757 I.
tinctoria (Indigofera) .. 712 I.
„ (Morinda) .. 1294 II.
„ (Wrightia) .. 1581 II.
tinctorius (Carthamus) 1429 II.
tinctorum (Rubia) .. 1306 II.
tingens (Euonymus) .. 572 I.
Tinospora .. .. 75—80 I.
tirucalli (Euphorbia) .. 2201 III.
Toddalia .. 465—67 I.
tomentosa (Aerva) .. 2064 III.
„ (Avicennia) 1954 III.
„ (Bauhinia) .. 892 II.
„ (Bragantia) 2119 III.
„ (Casearia) .. 1095 II.
„ (Dicoma) .. 1432 II.
„ (Guazuma) 381 I.
„ (Paederia) 1299 II.
„ (Premna) .. 1929 III.
„ (Randia) .. 1277 II.
„ (Sophora) .. 836 I.
„ (Terminalia) 1028 II.
„ (Vitis) .. 614 I.
„ (Wrightia) 1583 II.
toona (Cedrela) .. 562 I.
tora (Cassia) .. 878 II.
Torenia .. .. 1819—20 III.
tortuosum (Arisaema) .. 2604 IV.
torvum (Solanum) .. 1764 III.
toxicaria (Antiaris) .. 2334 III.
Trachelospermum .. 1588—89 II.
Tragia .. .. 2279—81 III.
Trapa .. .. 1090—92 II.
travancoricus (Calamus) 2588 IV.
Trema .. .. 2296—97 III.
Trewia .. .. 2265—66 III.
Trianthema .. .. 1179—82 II.
tribuloides (Astragalus) 738 I.
Tribulus .. .. 419—24 I.
triceps (Kyllinga) .. 2633 IV.
Trichodesma .. .. 1691—95 III.
Tricholepsis .. .. 1424—26 II.
trichomanes (Asplenium) 2744 IV.
trichophyllus
(Ranunculus) .. 14 I.
Trichosanthes .. 1106—15 II.
tricolor (Viola) .. 210 I.
tridentata (Merremia) .. 1734 III.
triflora (Prunus) .. 964 II.
triflorum (Desmodium) 760 I.
trifolia (Vitex) .. 1936 III.
trifoliastrum (Crotalaria) 697 I.
trifoliata (Cadaba) .. 194 I.

	Page.	Volume.
trifoliata (Indigofera) ..	711	I.
„ (Menyanthes	1670	III.
„ (Sapindus) ..	632	I.
Trigonella	699—702	I.
trigonus (Cucumis) ..	1139	II.
trigyna (Reinwardtia) ..	411	I.
trijuga (Heynea) ..	556	I.
„ (Schleichera)	629	I.
triloba (Clematis) ..	4	I.
trilobatum (Solanum)	1762	III.
„ (Typhonium)	2607	IV.
trilobus (Phaseolus) ..	794	I.
trilocularis (Corchorus)	401	I.
trinervia (Zizyphus) ..	591	I.
trinervis (Lepidagathis)	1894	III.
trinervius (Aster) ..	1337	II.
trionum (Hibiscus) ..	337	I.
tripartita (Bidens) ..	1372	II.
tripetala (Impatiens) ..	446	I.
triphylla (Dioscorea) ..	2489	IV.
triplinerve (Eupatorium) ..	1333	II.
triqueter (Rhamnus) ..	599	I.
tristis *var.* (Amaranthus gangeticus) ..	2060	III.
trita (Indigofera) ..	715	I.
Triticum	2699—2702	IV.
Triumfetta	395—97	I.
troupii (Tamarix) ..	247	I.
tsiela (Ficus)	2333	III.
tsjeriam-cottam (Embelia) ..	1481	II.
tuberculata (Ruta) ..	455	I.
tuberculatus (Dipterocarpus) ..	284	I.
tuberculatus (Elaeocarpus) ..	406	I.
tuberculosum (Heliotropium) ..	1687	III.
tuberosa (Ceropegia) ..	1638	III.
„ (Cyanotis) ..	2539	IV.
„ (Flemingia) ..	816	I.
„ (Ipomoea) ..	1728	III.
„ (Momordica)	1137	II.
„ (Polianthes) ..	2474	IV.
„ (Portulaca) ..	245	I.
„ (Pueraria) ..	792	I.
tuberosum (Allium) ..	2516	IV.
tubulosa (Cistanche) ..	1834	III.
tumbuggaia (Shorea) ..	290	I.
turbinatus (Dipterocarpus) ..	284	I.
turcomanica (Euphorbia)	2210	III.
turgida (Gardenia) ..	1280	II.
turpethum (Operculina) ..	1730	III.
Turraea	534—35	I.
Tussilago	1402—03	II.
Tylophora	1630—33	III.
Typha	2594—97	IV.
TYPHACEAE ..	2594—2597	IV.
Typhonium	2607—08	IV.

U

	Page.	Volume.
uliginosa (Cardanthera)	1863	III.
„ (Derris) ..	835	I.
„ (Randia) ..	1272	II.
umbellata (Elaeagnus)	2175	III.
„ (Grewia) ..	393	I.
„ (Morinda)	1296	II.
„ (Oldenlandia)	1264	II.
umbellatum (Memecylon)	1065	II.
UMBELLIFERAE ..	1188—1231	II.
umbraculifera (Corypha)	2570	IV.
Uncaria	1257—58	II.
undulaefolia (Crossandra) ..	1891	III.
undulata (Prunus) ..	964	II.
„ (Tecomella) ..	1841	III.
uniflora (Ipomoea) ..	1717	III.
Uraria	749—52	I.
urbanum (Geum) ..	970	II.
Urena	319—23	I.
urens (Caryota) ..	2557	IV.
„ (Sterculia) ..	365	I.
Urginea	2517—19	III.
urinaria (Phyllanthus)	2223	III.
Urtica	2340—42	III.
URTICACEAE ..	2290—2345	III.
urticaefolia (Leucas) ..	2021	III.
„ (Lindenbergia)	1811	III.
usitata (Melanorrhœa)	662	I.
usitatissimum (Linum)	408	I.
utilis (Betula) ..	2355	III.
„ (Prinsepia) ..	965	II.
utilissima (Manihot) ..	2289	III.
utilissimus *var.* (Cucumis melo)	1143	II.
Utricularia	1837	III.
Uvaria	61—63	I.

V

	Page.	Volume.
vaccaria (Saponaria) ..	238	I.
vaginalis (Monochoria)	2529	IV.
vahliana (Humboldtia)	891	II.
vahlii (Bauhinia) ..	896	II.
Valeriana ..	1309—13	II.
VALERIANACEAE ..	1306—1313	II.
Vallaris	1579—81	II.
Vallisneria	2397—98	IV.
Vanda	2406—09	IV.
Vandellia	1320—22	III.
Vangueria	1285—86	II.
varians (Glossonema) ..	1603	III.
variegata (Bauhinia) ..	898	II.
vasica (Adhatoda) ..	1899	III.
Vateria	291—93	I.
venenata (Hydnocarpus)	225	I.
venenatus (Alstonia) ..	1568	II.
Ventilago	584—87	I.
venustum (Adiantum) ..	2738	IV.
Vepris	467—68	I.

	Page.	Volume.
vera (Aloe)	2504	IV.
vera-cruz (Agave) ..	2468	IV.
verbascifolium (Solanum)	1753	III.
Verbascum	1803—06	III.
Verbena	1917—19	III.
VERBENACEAE ..	1912—1955	III.
Vernonia	1322—25	II.
Veronica	1826—28	III.
veronicaefolia (Sida) ..	306	I.
verrucosa (Crotalaria) ..	694	I.
verticillaris (Haplanthus) ..	1887	III.
verticillata (Malva) ..	303	I
vesicarius (Rumex) ..	2114	III.
vestita (Cordia) ..	1679	III.
Vetiveria	2670—73	IV.
Viburnum	1242—43	II.
vicaryi (Eremostachys)	2025	III.
Vigna	800—02	I.
villosa (Grewia) ..	390	I.
,, (Tephrosia) ..	725	I.
,, (Turraea) ..	535	I.
vinifera (Vitis) ..	607	I.
Viola	205—12	I.
VIOLACEAE ..	204—213	I.
violaceum (Aconitum) ..	32	I.
virginianum (Polygonum) ..	2103	III.
virga-aurea (Solidago) ..	1334	II
viridiflora (Wickstroemia) ..	2168	III.
viridis (Amaranthus) ..	2061	III.
,, (Mentha) ..	1979	III.
,, (Setaria) ..	2720	III.
virosa (Canavalia) ..	789	I.
,, (Flueggea) ..	2231	III.
viscida (Pseudarthria) ..	748	I.
viscosa (Cleome) ..	183	I.
,, (Dodonaea) ..	641	I.
,, (Stemodia) ..	1812	III.
Viscum	2181—85	III.
VITACEAE	602—621	I.
Vitex	1935	III.
vitifolia (Merremia) ..	1733	III.
Vitis	603—16	I.
vivipara (Remusatia) ..	2613	IV.
viviparum (Polygonum)	2098	III.
volubilis (Dalbergia) ..	821	I.
,, (Dregea) ..	1635	III.
Volutarella	1426—27	II.
vulgare (Hordeum) ..	2702—03	IV.
,, (Marrubium) ..	2008	III.
,, (Origanum) ..	1986	III.
,, (Sorghum) ..	2723	IV.
vulgaris (Artemisia) ..	1395	II.
,, (Beta) ..	2077	III.
,, (Brunella) ..	2006	III.
,, (Citrullus) ..	1140	II.
,, (Cydonia) ..	985	II.
,, (Lagenaria) ..	1116	II.
,, (Quamoclit) ..	1713	III.
vulgatum (Ophioglossum)	2751	IV.

W

	Page.	Volume.
Wagatea	853—54	II.
Wallichia	2555—56	IV.
wallichiana (Trichosanthes) ..	1115	II.
wallichianum (Geranium).	431	I.
,, (Lilium)	2522	IV.
wallichii (Bragantia) ..	2119	III.
,, (Cordia) ..	1677	III.
,, (Heracleum)	1223	II.
,, (Melanorrhoea)	663	I.
,, ((Rhus) ..	647	I.
,, (Scaphium) ..	369	I.
,, (Schima) ..	278	I.
,, (Valeriana) ..	1311	II.
,, (Wedelia) ..	1365	II.
Walsura	554—55	I.
wampi (Clausena) ..	477	I.
webbiana (Abies) ..	2392	III.
webbianum (Rheum) ..	2109	III.
Wedelia	1364—65	II.
Wickstroemia	2168—69	III.
wightiana (Acampe) ..	2411	IV.
,, (Hydnocarpus)	224	I.
wightii (Rhamnus) ..	598	I.
Withania	1773—79	III.
Woodfordia	1074—76	II.
Wrightia	1581—84	II.

X

	Page.	Volume.
xanthocarpum (Solanum)	1759	III.
xanthochymus (Garcinia)	265	I.
xanthioides (Amomum)	2432	IV.
Xanthium	1355—57	II.
Ximenia	566—67	I.
Xylia	905—06	II.
xylocarpa (Radermachera) ..	1850	III.
XYRIDACEAE ..	2530—2532	IV.
Xyris	2531—32	IV.

Y

	Page.	Volume.
yatai (Cocos) ..	2586	IV.
Yucca	2503—04	IV.

Z

	Page.	Volume.
zanonia	1168—69	II.
Zanthoxylom	459—65	I.
Zataria	2027—28	III.
Zea	2658—61	IV.
zedoaria (Curcuma) ..	2420	IV.
zerumbet (Zingiber) ..	2438	IV.
Zeuxine	2411—12	IV.

Page. Volume.
zeylanica (Capparis) .. 200 I.
" (Girardinia) 2298 III.
zeylanica (Helminthostachys) 2752 IV.
" (Hydrolea) .. 1672 III.
" (Kokoona) .. 574 I.
" (Leucas) .. 2018 III.
" (Pavonia) .. 324 I.
" (Plumbago) .. 1466 II.
" (Smilax) .. 2495 IV.
zeylanicum (Antidesma) 2239 III.
zeylanicum (Cinnamomum) 2149 III.
" (Glochidion) 2230 III.
" (Trichodesma) 1694 III.
Zingiber .. .. 2435—40 IV.
zizanioides (Vetiveria) 2671 IV.
Ziziphora .. .. 2028—29 III.
Zizyphus .. .. 588—96 I.
Zornia .. .. 744—45 I.
Zosimia .. .. 1223—24 II.
ZYGOPHYLLACEAE 419—428 I.
Zygophyllum .. .. 424—26 I.

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